BULLETIN OF THE HISTORY OF MEDICINE

ORGAN OF THE AMERICAN ASSOCIATION OF THE HISTORY OF MEDICINE
AND THE JOHNS HOPKINS INSTITUTE OF THE HISTORY OF MEDICINE

Editor—HENRY E. SIGERIST

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PREFACE TO VOLUME VIII

The *Bulletin* has just completed its first year under the new regime, and I think that both partners have good reasons to be satisfied with the arrangement. The American Association of the History of Medicine for the first time was able to publish the Transactions of its Annual Meeting in full. The members of the Association, for their very modest membership dues, received the *Bulletin* regularly which in the past year published 1212 pages containing 33 articles, 15 texts and documents, 12 notes and comments, 130 illustrations, and which in addition endeavoured to keep members informed about medico-historical activities at home and abroad. The *Bulletin*, on the other hand, was enabled to increase its circulation considerably.

The new volume is opening in troublesome times. The war long expected, long delayed has broken out and once more the world is aflame. International relations in the field of science and learning, laboriously restored after the last war are broken off again. Nobody knows how long the war will last, how far it will spread and what the outcome will be. But one thing is certain, that after the war the European countries, whether victor or victim, will be so weakened economically that they will have little time and still less funds available for scholarly endeavours.

The greater therefore is our responsibility in America. It is our turn to carry the torch, more than ever, and it will be our task to

take the initiative in restoring international relations as soon as conditions permit. We must carry on incessantly and develop our Association and its Constituent Societies still further so as to make them strong centres of studies in the history of medicine.

Suffering knows no boundaries and medicine is international. Every country has contributed its share to the advancement of science. Nationalism has poisoned the world and has distorted the historian's vision. Let us keep free of that virus and pursue our studies in a broad, scientific and tolerant spirit.

I wish to express my great appreciation to Dr. Owsei Temkin who during my long absence in South Africa so ably edited the *Bulletin* and acted as Secretary to the Association.

HENRY E. SIGERIST

UNIVERSITY EDUCATION *

HENRY E. SIGERIST

Mr. Chairman of the Council
Mr. Principal
Ladies and Gentlemen,

I am deeply moved and I wish to express my profound gratitude for the great honor bestowed upon me by the University of the Witwatersrand. Sometimes I feel that honorary degrees are somewhat like arteriosclerosis, a symptom of the beginning of old age. You have worked assiduously for a long time. You are getting on in years. Your arteries begin to harden and your work to be recognized. But then, of course, there is a great difference in that arteriosclerosis is a most unpleasant symptom—of which I have been spared so far—while the recognition of a man's work is the strongest encouragement he can possibly find and the most powerful incentive to pursue in his endeavours. And for an academic teacher there is no higher distinction than to be admitted among the honorary graduates of a university.

In honoring me you have at the same time expressed your appreciation of the field of research to which I have devoted my life's work. And since it is unusual for a physician to study the history and sociology of medicine, let me tell you how I became interested in the subject and let me pay tribute to the memory of some great teachers it was my good fortune to have. If I have been able to make a contribution to my field of studies—modest as it may be—it was due to hard work, without which nothing is ever achieved, but also and to a large extent to the inspiration I received from great teachers.

I have to go far back to recall the figure of the first teacher who had a profound influence on the formation of my mind. When, in 1901, my family moved from Paris to Zurich, in Switzerland, I was ten years old, and since I had a very imperfect knowledge of German I was sent not to a public but to a private school. It was owned

* An Address delivered at Selborne Hall in Johannesburg on November 15, 1939 on the occasion of the conference of the degree of Doctor of Literature *honoris causa* by the University of the Witwatersrand.

and directed by an educator of genius, *Fritz von Beust*. Son of a German revolutionary who after 1848 had sought asylum in Zurich and opened a progressive school, he followed in the footsteps of his father. A strong man with a pink face and white beard, he was a convinced socialist and atheist and was first of all an enthusiastic scientist. Science played a dominating part in the curriculum. The rotation of the earth was demonstrated to the children by having them build a sundial in the garden and watching it through the seasons. We learned geometry by making cubes, cones and other bodies. In geography we pasted maps on cardboard, dissected the various altitude layers with the jig saw and mounted them so as to construct relief maps of the country. And every few weeks we made whole-day excursions into the beautiful surroundings of Zurich. The geography of the region was discussed but the chief purpose was to collect plants. Each one of us had a herbarium, and at the age of twelve we had learned to analyse the structure of plants and were able to diagnose the family of every one of them. A most liberal spirit pervaded the school. Teachers and students were carried away by von Beust's personality whose mere presence was sufficient to insure discipline. He opened up for me the realm of nature and awakened in me as in so many others a deep interest in science. It was only much later that I realized how much the three years spent in that school had influenced my whole outlook. After von Beust's death the school was continued for a few years by his co-workers but the driving spirit was gone and the school closed down. It could afford to do so because in the meantime the public schools had adopted most of its principles.

In 1904 I became a student of the *Gymnasium* in Zurich. It was a public school preparing boys from all classes of society for academic studies. I was in the humanistic division where for six and a half years we had eight hours of Latin and for five and a half years eight hours of Greek a week, so that at the end of the course most of us could read Latin and some of us also Greek fluently. In spite of the emphasis on the classics, modern languages were not neglected. French was a required subject all through the course and we had a choice between English and Italian. In addition we had excellent instruction in science which proves that it is quite possible to combine science with humanistic studies.

Among the many teachers I had during that period one stands out far above all the others: our professor of history, *Otto Markwart.* He was not a detached but a passionate historian, violent in his sympathies and antipathies. He worshipped Mozart and loathed Wagner. A student of Jakob Burckhardt he was a humanist, deeply attached to Italy where he spent his vacation every year, returning with piles of photographs that he passed around in the classes. An enthusiastic teacher he could electrify the students. Discussing a stormy session of the Roman Senate he jumped up addressing the class: "You are the Roman Senate. What are you going to do? You have defeated Carthage but again she raises her head threateningly. You there in the corner are Cato. Get up and tell them what they shall do!" And the boy, Cato himself, addressed the "Senate" passionately, ending his harangue with the ominous *Ceterum censeo. . . .*

From Markwart I learned what history is—not a dead subject but a living force that determines our life. He taught us to think in terms of historic forces and developments. And in his broad approach to history that embraced all aspects of civilization he passed on to us boys the teachings of his master Jakob Burckhardt whose classical books we devoured.

The old Gymnasium in Zurich was a great school to which I owe infinitely more than I was aware at the time. It had a great tradition of liberalism and all philosophies were represented among the faculty. It taught us how to organize our work and succeeded in challenging us and arousing our intellectual curiosity so that we could spend whole nights discussing Plato, Kant, Darwin, Haeckel, or Marx, and sometimes almost came to fist fights over problems of Russian literature or modern art. When we graduated at the age of eighteen or nineteen we were well prepared for the university.

During my gymnasium days I became interested in the East and since the language is the key to the understanding of every civilization I began learning Arabic. For a number of years I spent an early hour on the study of Arabic every morning before going to school. I then took the Hebrew courses that were offered at the Gymnasium to those students who intended to study theology. After graduation I registered in the Philosophical Faculty of the University of Zurich as a student of oriental philology. I continued my

studies of Arabic and Hebrew and took up Sanskrit. And since the latter course proceeded rather slowly I worked with a private tutor and at the end of the year we were reading the Panchatantra and similar texts.

In those days the University of Zurich was rather weak in oriental studies and this determined me to spend most of the year 1911 in London. I had some excellent courses at University College, and since I was the only student attending them learned a great deal. With Mabel Bode I read the Meghaduta and with H. Hirschfeld the Fakhri and the Delectus Veterum Carminum Arabicorum of Noeldeke. At the same time I began the study of Chinese at King's College and devoted a great deal of time to it. My teachers were rather skeptical and repeatedly pointed out to me that it was impossible to embrace the whole Orient that I would have to specialize either on the Near East, on India, or on the Far East. But I refused to specialize. I was interested in the East as a whole, in comparative religion and comparative literature, in the migration and transmission of literary subjects and similar problems. And since I was very young I thought that nothing would be impossible to me.

I worked very hard in those years and always had some grammar in my pocket and a notebook full of Chinese ideograms. But the time came when I had to admit that my teachers were right. It could not be done. The task became so big that quite physically I could not master it. But I still refused to specialize and since I had always been greatly interested in science I went back to the University of Zurich and took the science courses that were given to students of science as well as to medical students.

There, again, it was my good fortune to have a great teacher, the professor of zoology and comparative anatomy, *Arnold Lang*. He was a former student of Haeckel, a great expert in zoology of the invertebrates and in genetics. His lectures were entrancing and we never missed a single one. During a course he never attempted to cover the whole field but discussed only a few selected subjects, a few animal forms, elements of genetics or similar topics. These he presented in great detail giving the history of the problem and discussing general principles connected with it. He could spend weeks developing the structure of one animal, drawing it in colored chalks

on the blackboard. And when, at long last, he had given the finishing touch his bearded face brightened up and he felt like God after the creation of the world. He had recreated the worm, or the fish under our very eyes. And having watched this creative process we could never forget it. We had been allowed a glimpse into the workshop of nature.

At the end of the course he apologized for having covered so little ground but added that we could easily find the rest in books, and that if we had followed him we would be able to consult and use books intelligently. I never had an opportunity to talk to Professor Lang. He did not know of my existence. I was just one of hundreds of students who crowded his lecture hall. But I was tremendously influenced by him because I had the privilege of watching the working of his mind. And from him I learned how to teach. Much later, when I became an academic teacher myself, I remembered how he had presented his subject, built up his lectures and organized his courses. The European university has a great tradition of academic oratory, an art that is not taught in courses but passed on from master to student through example and by the mere force of personality.

My year in science was a happy one and for a while I considered remaining in science, but again the phantom of specialization arose. What was it to be: chemistry or zoology or botany? Medicine seemed the broadest field, and so I became a medical student and never regretted it. Medicine undoubtedly is one of the most fascinating academic subjects in that it leads the student through heights and depths of human life.

I studied medicine at the University of Zurich where I graduated in 1917 and at the University of Munich where I spent the summer of 1914. I had many excellent teachers during the six years of my medical course but two of them stand out far above all others: *Friedrich von Müller* and *Ferdinand Sauerbruch*. They were very different but great teachers both.

Friedrich von Müller was at the height of his career when I took his course. He was professor of clinical medicine in Munich, a dignified personality and a great physician and scientist with vast cultural background. He represented the best type of German professor.

His task was to introduce the young student into the field of clinical medicine. Every morning he gave a clinic of two hours at which he presented one typical case. Four students were called upon and with them he examined the patient and discussed the case, while the others watched them with breathless attention. His presentation invariably began with the question: "What do you see, what strikes you when you look at the patient?" whereby he meant to develop our faculty of observation. He repeated over and over again that medicine was not difficult provided we had a thorough foundation in anatomy, physiology and general pathology. "You must know the structure of the human body, its function and the mechanisms available to the organism to react against lesions. The rest boils down to observation and correct reasoning." And this was what we learned from him first of all: to observe phaenomena and to reason correctly. I followed his precepts all through my studies and it saved me a lot of trouble. Von Müller's teaching was so impressive that to the present day I remember every individual case he presented during the course and even remember the face of many of the patients. The class-room was crowded with hundreds of students and a regular race for seats took place every morning.

Sauerbruch was an entirely different personality. He came from Marburg to Zurich in 1911 as professor of surgery. He was young, enthusiastic and temperamental. Students loved him or hated him but nobody who ever came in touch with him remained indifferent. He was an intuitive type of man, a brilliant surgeon who in his surgery as well as in his researches showed a great deal of imagination and originality. His clinic was inspiring and spectacular. Once, desiring to impress upon us the importance of the early operation of appendicitis, he demonstrated over twenty cases in one clinic, some of whom had been sent in for operation too late. Bed after bed was rolled in. The professor hardly said a word but the difference between the patients was striking. All those who had been operated on early looked flourishing while the others looked very sick. It was a piece of showmanship but nobody ever forgot the lesson. Sauerbruch taught us infinitely more than surgery. He made us think—think in terms of biology. A student could pass an examination with him without knowing many facts provided he was able to approach

a case intelligently and to think properly. In his early years in Zurich Sauerbruch gave a course in general surgery that was attended by students of all classes, by the faculty and by the practitioners of the city. One had to be there an hour in advance to secure a seat. Every single lecture was a masterpiece, well-rounded, full of original ideas and challenging thoughts. It was certainly not by accident that Sauerbruch, like Müller and all great medical teachers I ever had, was deeply interested in the history of medicine and never missed an opportunity to make historical remarks. Men who made history were always aware of developments in which they were taking part. I was Sauerbruch's student for three years and came closer to him than to most of my medical teachers. He took a genuine interest in young people and kept an open house in which students were always welcomed. During the war he took a group of us on a most instructive tour through German military hospitals, and later, in Germany, he helped me in my career whenever he had an opportunity. Sauerbruch's teachings and personality had a profound influence upon my own development and I shall remain attached to him all my life.

I was an enthusiastic medical student, but I obviously remained interested in the humanities. In Zurich, medical school and university were on the same campus so that it was possible for medical students to attend courses in the academic division, which I frequently did. In Munich, once in the middle of the academic year I suddenly felt tired of the hospital and of medicine at large. I began skipping classes and spent the days in museums and art galleries, the nights in theatres and concert halls. I was in a turmoil and when quite accidentally I met a friend in the street who was leaving the same day for Venice I decided to join him, and spent several weeks in Italy. For a while medicine was entirely forgotten and I lived in a world of history and art. Then, one evening, sitting in a café of the Piazza San Marco I felt an irresistible longing for the hospital, and there for the first time it occurred to me that medical history and the history of science might be a field in which I could combine all my interests. I went back to Munich the same night in a state of great elation. The next morning I resumed my hospital work with enthusiasm. In the afternoon I went to the Library where I found

Isis, the journal recently launched by George Sarton, and the various publications of Karl Sudhoff. In the next few days I made a plan to study the various periods of the history of medicine and science by reading the most important texts. A German publisher was issuing a series of historical source-books that included the history of science and I soon was collecting materials for a history of oxidation. But then the war broke out. We were all called for practical work and the book was never finished.

Here I must recall one school that taught me probably just as much as the university, although I was not fully aware of it at the time: the Army. I served for nearly two years in the Medical Corps of the Swiss Army. In Switzerland every citizen is trained to be a soldier and medical students are automatically enlisted in the Medical Corps at the age of twenty, where they are promoted to higher rank according to their professional status and length of service. At the outbreak of the World War the entire army was mobilized and kept under arms for the first eight months. After that time when it became apparent that the country was not immediately threatened only one-half of the army was kept at the borders so that throughout the war we medical men spent half of the year in army service while we could continue our civilian work during the other half.

The two years in the army were a valuable experience to me in many respects. Medically I learned a great deal. We were often stationed in far remote mountain valleys where we had to attend the civilian population as well as the troops, sometimes under very difficult conditions. Much of the work was practical public health work in which I became greatly interested. The Medical Officers' Training School gave excellent instruction not only in war surgery but particularly in public health. In 1918 I had the good luck of being one of the first in my division to be stricken with influenza so that I was fit again when many of my fellow medical officers were sick. I spent most of the year treating influenza patients in a variety of troops and regions and worked for several months in the Influenza Bureau of the Surgeon General's office from which I was sent out to make epidemiological surveys all over the country.

But the army was a great school to me in other respects as well.

So far I had lived the life of the middle class and had moved mostly in academic circles. I was interested in social problems but looked at them more from the theoretical and public health angle. In the army I came in close touch with the working class. In the cavalry to which I was attached for over a year the soldiers were peasants, in the artillery to which I was transferred later they were factory workers, most of whom were employed in several large metallurgical plants in the vicinity of Zurich. These anonymous soldiers became my teachers. They opened my eyes about many problems that I had not seen before and made me realize how little I knew about the world in which I was living. They made me visualize a field of research and activity equally important to the historian as to the medical man. They had confidence in me and on many evenings I went to the sick-room under the pretext of a late ward-round, sat on a bed and listened. They discussed their own problems and discussed the war. And it often struck me how much more convincing their interpretations were than those I heard in the officers' mess. Switzerland, neutral but surrounded by warfaring countries, was an ideal post from which to observe events. Information was obtainable from all sides and it was much easier to get at the truth than in those countries where unilateral heavy propaganda obstructed the vision. The imperialistic character of the war soon became apparent and it was not difficult to realize the full significance of the Russian Revolution.

The armistice was signed and the war was over, at least nominally. I was twenty-seven years old. I had an all-round medical training and had acquired some practical experience in medicine and public health. During the interval between two service periods I had interned for a while in obstetrics and in my senior medical year I had done experimental research in the Pharmacological Institute of the University of Zurich under Prof. Cloetta, as the result of which I had published my inaugural dissertation under the title " Experimental investigations on the effect of chronic camphor medication on the normal and sick heart." And now the question arose what the next step would be?

I knew what I wanted and felt no hesitation about it. My field of research was to be medical history. To most of my former professors I was a lost sheep. " Medical history," they said, " is a delight-

ful hobby for retired practitioners but there is no career in it." I was no longer a child and knew better. And this time I was right. In all my previous studies I had felt the need for an historical approach to any given problem. I saw that general history must by necessity remain fragmentary and lead to wrong interpretations if it does not include the history of science. And I felt, although rather vaguely at the time, that medical history studied in a broader sense could be developed into a method that could contribute to the solution of urgent social problems of medicine. In medical history I found a field that was not a narrow specialty and in which I could combine my various interests. I was fully aware that I was not yet equipped for such studies and that I would have to go back to school for at least three years. And since I could no longer afford to make a wrong start I went to Leipzig, in 1919 as soon as conditions permitted in order to consult and work with *Karl Sudhoff*.

The Institute of the History of Medicine founded in 1905 at the University of Leipzig was at the time the undisputed centre of research in medical history. The Institute was Karl Sudhoff. He filled it with his powerful personality. It was his workshop that he had built up. He had no associates and no secretary and was only aided by an " Institutsdiener " who served him devotedly and kept the place in order. But he had a large group of students who wrote their inaugural dissertations under his guidance and published for him the texts in which he was interested. And every researcher in medical history from all over the world came to Leipzig to consult him and to use the resources of the Institute.

He was an indefatigable worker. From 1905 on, when he abandoned general practice and accepted the chair in Leipzig he published a large number of monographs, hundreds of papers and edited half a dozen journals and serial publications. His bibliography shows that in certain years he published over forty papers—mostly mediaeval medical texts that he had discovered in his annual peregrinations. He was a poor lecturer, was restless in his thinking so that he could jump abruptly from one subject to another without finishing his sentences. The lectures, therefore, were rather confused and it was hard to follow him. He exerted his tremendous influence not through teaching but through his writings and personal contacts.

He had a kindly nature and could be very jovial, but he could also flare up and in such moments he looked like *Jupiter tonans*. His eyes sparkled and his voice was thunder. A dominating and domineering personality he could not tolerate to have anybody beside him, and colleagues who did not accept his leadership were excommunicated pitilessly.

He was different to me. He was infinitely more than a teacher, was like a father to me. My first visit in 1919 was the beginning of a very close association that lasted for many years. From 1919 to 1925 whether in Leipzig or in Zurich, I was in constant touch with Sudhoff. He supplied me with books, photostats and photographs from the Institute collections and helped me in any possible way. I had the privilege to assist him in reading and correcting galley proofs of several of his books, and we met every year at the annual meetings of the German Society of the History of Science, Medicine and Technology. From 1925 when I succeeded him in the chair at Leipzig to 1932 when I left for America, we met almost daily and there was not a thing on earth that we did not discuss. In 1933 I was awarded the Karl Sudhoff Medal and on the occasion he wrote in longhand an appreciation of my work that I treasure more than anything else. After that time to my deep sorrow our close relationship gradually came to an end. Karl Sudhoff had joined the National Socialist Party. It was a profound shock to me and for a long time I could not understand how he, a staunch liberal and rationalist all his life, could at the age of eighty become a Nazi and identify himself with Hitler's doings. I have only one explanation for it, that he was driven by his fanatic patriotism. He deeply felt and resented the humiliation of Germany after Versailles, and like so many others must have honestly believed that Hitler would be the saviour of his country.

Karl Sudhoff died in 1938. He was the great pioneer in medical history who not only advanced the subject by leaps and bounds through his researches but also organized it and gave it a definite place in the medical curriculum. The Leipzig Institute was the first research institute ever established in the field. It set a high standard of scholarship and served as an example that was soon to be followed by other universities in Germany and abroad. It was my good

fortune that I could begin my career in such an institute and with such a teacher. It gave me a solid philological foundation without which serious studies are just as impossible in medical history as in any other historical discipline.

In 1921 at the age of thirty I felt sufficiently prepared to apply for an academic position. I was appointed *Privatdozent* at the University of Zurich where I had a small but devoted group of students. When Sudhoff retired in 1925 his chair and the directorship of the Leipzig Institute were offered to me. It was not an easy job to be the successor of such a great man. I realized that the task was not to imitate my predecessor but to preserve the high standard of the Institute while developing it along my own lines. Sudhoff was primarily interested in the philological side of medical history in texts and documents that he published by the hundreds. I had become increasingly interested in the sociological approach to history and in the sociology of medicine. I saw that the application of medical knowledge to society was made so difficult by a variety of social, economic, political, religious and philosophic factors that had to be investigated if progress was to be achieved. Without neglecting philological studies I endeavored to develop the Institute more and more along the sociological line. My book *Man and Medicine* written in those years reflects this attitude.

It was in 1927 that I first came in touch with *William H. Welch*. He had done more for the development of scientific medicine in America than anybody else, and now nearing the end of his career he intended to establish at the Johns Hopkins University in Baltimore, with which he had been connected since 1884, an Institute of the History of Medicine similar to that in Leipzig. He was travelling in Europe purchasing books for the new Institute and came to Leipzig to discuss his plans with Karl Sudhoff. I was in touch with Dr. Welch from 1927 to the time of his death in 1934 and although I cannot claim him as one of my teachers I learned a great deal from him as everybody did who had the good fortune to be close to him. As a matter of fact, I wished I had learned more from him, particularly his unaggressive way of attaining an end by diplomatic means. Temperaments, however, are different.

The Johns Hopkins Institute was opened in 1929. Sudhoff went

to America for the occasion. Two years later in 1931 I was invited as visiting lecturer. I spent two months at the Institute whereupon I went on a long lecture tour through all sections of the United States. And while I was travelling I was offered Dr. Welch's chair.

I was tremendously impressed by the United States. I found democratic institutions dear to me and found the country utterly different from what it is usually pictured by European travellers who see only the façade and the material aspect of American life. I was particularly impressed by the universities, by their earnest desire to raise standards of scholarship and to carry on the torch of learning. I found them fully aware of their great responsibility at a time when European institutions were breaking down under political and financial pressure. Great interest was shown all over the country in medical history, the importance of which had been emphasized by all medical leaders. And I found urgent social problems of medicine, eagerly discussed by all groups involved. The Committee on the Costs of Medical Care was at the peak of its activities. What appealed to me particularly was the dynamism of America and its brave experimental spirit, so utterly different from the stifling self-satisfaction and fossilizing feeling of superiority so often met with in Europe.

In Germany things were developing from bad to worse and it was apparent that the days of academic freedom were counted. It was not difficult, therefore, to come to a decision. Once more I was successor to a great man, in one of the world's great medical schools, in a university justly famous for its scholarship and liberal spirit. I was in charge of a young Institute, in a young and vast country—and I have enjoyed working in America ever since I first landed in the new world.

Ladies and Gentlemen,

I apologize for this lengthy personal history in an address devoted to the subject of university education. But instead of discussing the topic in a purely theoretical way I preferred to give you a practical demonstration in evoking the figure of some men who were great academic teachers and in discussing factors that contribute to the success of university education. Let me add a few remarks.

When I look back at my early university life it occurs to me that such a career would be rather difficult in America as well as in South Africa. Our students are so well protected, are guided and advised so well that they have hardly a chance to make mistakes. Much thinking is done for them, and they hardly have an opportunity to find things out for themselves. I made endless mistakes but I learned through them and found my own way.

I have a particular grudge against textbooks, the only literature ever consulted by many students. Instead of reading Plato or Newton the student reads about them and thinks that he knows them if he is able to repeat a few judgments read in a book. The textbooks present a subject carefully digested and in a simplified way. They read without effort and are forgotten over night. Do not misunderstand me. There are excellent textbooks and when used judiciously they have an important function to fulfill. They allow a rapid orientation over a wide field. But they can never replace the study of original texts.

When a publisher wishes to recommend a book he advertizes it as being "highly readable." He may even add that it is written in a "delightfully informal way." And when a reviewer wants to praise a book very highly he emphasizes its readability, by which he means that every fool can read it without effort. And yet we all know that the books that contribute most to the formation of our minds, the books that have made history, are anything but "highly readable." They are books with which we struggle, that we read and reread with pencil in hand, books that we have to conquer page by page. But once we have conquered them we possess them. Many subjects are difficult by nature and a presentation ceases to be true when it is over-simplified. No knowledge can be obtained without labor and we should not be afraid to require great efforts from our students.

The gown that we are wearing to-night is a mediaeval costume, and this reminds us that the Western university has a long tradition and a great past. From the mediaeval university we have inherited many external forms such as the organization in faculties, examinations, degrees and also the main forms of teaching: *lectio* and *disputatio*.

In the lectio the mediaeval professor read and interpreted a book,

and the students wrote down what they heard. Books were rare and expensive in those days and the books the students wrote during the courses became the main body of their libraries. Conditions have changed since then. Printing has made books easily available and has reduced their price considerably. The function of the lecture, therefore, no longer is to dictate books. The student can buy them for little money. The lecture must give what the student will not so easily find in books, namely the living personal contact between man and man. In the lecture the professor, an expert in his field, thinks aloud and develops his own views on a subject. He has an ideal opportunity to stimulate the student, to arouse his curiosity or to challenge him, in other words: to make him think.

We can study a symphony at home, from the score and phonograph records, but this does not make concerts superfluous. In a concert we hear the interpretation of a symphony by a definite conductor and there is that magnetic contact between orchestra and audience that is so hard to define. The concert, moreover, inspires us and stimulates us to study music of which we had not thought before.

As a student I had a simple method which I found very helpful. When I knew what the subject of a lecture or a clinic would be I read about it before so as to have a certain preparation. During the lecture I made a few notes, as few as possible, just enough to be able to reconstruct the lecture. Students who write much do not listen. And then in the evening I consulted a number of books on the subject and wrote a summary of what I had read and heard, made notes about my personal impressions and doubts, and marked points that would require further study. I did it on loose leaves so as to be able to add to it on later occasions.

In the mediaeval *disputatio* professor and students discussed a subject, weighing the pros and cons of an argument. The corresponding modern form of teaching is the seminary course that was so strongly developed by the German university. Here the students take an active part, presenting papers, reporting on studies made, and the professor's function is to lead the discussion. Here the professor has an opportunity to teach methods of research, to show the students how to approach a problem, how to get at facts and how to interpret them.

The rise of modern science called for new forms of academic instruction unknown to the mediaeval university: laboratory courses and clinical instruction at the bedside of patients. These new methods of teaching so highly successful in the natural sciences begin to be applied to the social sciences. Political science cannot be taught in the class-room alone. It requires field work in parliaments and government offices. Economics is a dead subject if the student has no opportunity to watch the process of production and distribution in mines, factories, farms, shops, railroad offices and the stock exchange. And if sociology is to be more than the philosophy of history it requires still more extensive field work. The best curriculum is one in which the various forms of instruction, lecture, seminary course and practical work are perfectly balanced.

The task of university education is not to transmit an established body of knowledge because there is no such thing. Science and the humanities evolve from day to day. If a student left the university with nothing more than the knowledge accepted in his year of graduation he would soon be hopelessly behind. The university must do infinitely more than teach facts and theories. It must help the student to develop his faculties, must train him to think independently and critically, so that he may form his own judgments. It must teach him methods of study so as to enable him to keep pace with developments. It must open up horizons for him, lead him in attaining a correct sense of values, in developing his attitude toward life, in one word, his philosophy. The actual work must be done by the student himself. Nobody can do it for him. But the university helps him by giving him the privilege to live and work for a number of years in close touch with a group of men who have devoted their lives to the advancement of knowledge.

If academic instruction is to be fruitful it must be based upon research. Only men who have been actually engaged in research are competent to present a subject adequately. The student feels instinctively whether a professor is merely abstracting a textbook or whether he speaks with authority. We all have to teach subjects that we have not explored ourselves, but if we are researchers we are able to evaluate other people's results critically. I am well aware that it is often extremely difficult for a professor to continue his re-

searches. Many are unduly burdened with teaching. The rapid development of our universities has created so many administrative tasks that time and energy of many departmental heads are entirely absorbed by them. And since the professors are experts they are called upon for advice by the state and other agencies. It is impossible to evade these tasks. Academic teachers should not live cloistered in their studies but keep in close touch with life, feeling the pulse of a society for which they are preparing young people. Departments must be administered. They are serving not only present needs but are building up collections and storing experience for the future. It is increasingly difficult to be professor and researcher at the same time, and a situation has arisen that may wreck the university if a solution is not found.

In spite of all difficulties the academic teacher must remain a researcher. It means incessant hard work, and many amenities of life must be sacrificed. But the compensations are endless.

There is another point to which I would like to draw your attention. The mediaeval university was the *Universitas Litterarum*. It emphasized the universality and unity of learning. It is true that it also trained young people to be physicians and lawyers, but medicine and the law were part of the general philosophy of the time and therefore close to theology. And the students of medicine and law were first trained for many years in the Faculty of Arts. The goal of university education was to produce an all-round scholar, an ideal that was carefully preserved for centuries. The word *doctor* means *scholar*, a point that we sometimes forget. Conditions changed in the nineteenth century when the development of science led to increasing specialization. A deep split occurred between the humanities and the new science. Many universities today are merely conglomerations of professional schools with hardly any bond between them.

Specialization occurred by necessity. No man can possibly embrace the entire realm of knowledge. If science, medicine and technology have progressed so tremendously, it was largely due to the specialization in research. We need highly trained specialists. But we need more than specialists. If there is so much trouble in the world today and if it is so extremely difficult to make necessary adjustments it is to a certain extent due to the fact that many men

in leading positions are nothing but narrow specialists whose general and political education has been utterly neglected.

We who have the privilege of living in a democracy have not only professional duties but also duties as citizens. We have responsibilities not only toward our families and the institutions in which we work but also toward the community and society at large. How can we expect a democratic state to function efficiently if those men who had the maximum of education, who were trained in universities are mere specialists unprepared for their civic duties, unwilling to assume responsibility and leaving the welfare of society in the care of politicians whose only qualification very often is that they like the game and find it profitable?

It seems to me that here the university has an extremely important function to fulfill. The point is not to set the clock back and to return to the Middle Ages. We shall continue to develop highly trained specialists, but we must give them a broader equipment. In South Africa as in England students enter professional colleges immediately after leaving secondary school, which greatly reduces the opportunities for general higher education. In the United States the requirements for admission to a professional school include either a completed or at least a few years' course in a College of Arts and Sciences. This is better but still not enough. General education must continue in the professional schools and must be correlated to the subject of the course. Whatever a man's specialty is going to be, he should be familiar with its history, its sociology, its philosophy. This will by necessity broaden his outlook and increase his usefulness.

We must try to overbridge the gap between the old humanities and the new science, between the social and the natural sciences. If the old humanities include studies in ancient science they will not die but remain eternally young, a source of inspiration and happiness for generations to come. If history includes the history of science it will become a still more powerful weapon in the shaping of the future. If economics and sociology get closer to the natural sciences and adopt more of their methods they will greatly benefit by it. And if we succeed in bringing the humanities and the social sciences into the natural sciences we shall be able to develop a scientist who will be more than a narrow specialist, who will be aware of the place of

science in the world and of its function in society. Nothing could be more encouraging than to see that already there are great scientists, great specialists in their respective fields, men like J. B. S. Haldane, J. Needham, H. Levy in England, J. Langevin in France who without neglecting their laboratories, are fully conscious of the burning problems of our time and are taking an active part in their solution.

My own work as an academic teacher is devoted to the task of preparing physicians that will be aware of the historical moment in which they live, aware of their great social responsibilities and of the economic necessities of medicine so that they will be equipped to take an active and intelligent part in the life of society and in the developing of a system of medical services that will reach everybody, whether rich or poor, whether white or black.

Ladies and Gentlemen,

Once more I wish to express my profound gratitude for the great honor bestowed upon me by this University. I appreciate it more than I can tell, not only because it shows me that you did not regret having invited me to South Africa as a visiting lecturer, but because it connects me permanently with a university for which I have a great admiration and to which I have become deeply attached.

It was my privilege to meet many members of your faculty and many of your students, and I was greatly impressed by their progressive attitude and liberal outlook. I have no doubt that the young men and women trained in this University will exert a marked influence upon the destinies of the country.

I shall be proud to wear your colors in America and I want you to consider me an American outpost of the University who will always be happy to serve you.

And so let me end by saying: Long live, grow and flourish *our* University—the University of the Witwatersrand.

A PHYSICIAN'S IMPRESSION OF SOUTH AFRICA *

HENRY E. SIGERIST

On the eve of my departure I greatly welcome the opportunity to bid farewell to my many friends in South Africa and to express my profound gratitude for the delightful hospitality extended to me all over the country during a period of more than four months. South African hospitality is famous in the world but what I found surpassed all my expectations.

I came to this country early in August under the auspices of the *South African Universities' Lectureship Committee* and now that my tour has come to an end I am justified in saying that—to the lecturer at least—this Lectureship is a splendid institution which I hope will be maintained in the future. It brings a scholar from overseas to South Africa not on a hurried tour but for several months so that he has an ideal opportunity to visit the various sections of the country, to acquaint himself with its problems and to make valuable and pleasant contacts with colleagues and students.

I spent five weeks in Cape Town where I gave a course of lectures at the University, and I am sure everybody will agree that no institution of learning in the world has a more beautiful site than the University of Cape Town. I then lectured to the students of Huguenot University College in Wellington and Rhodes University College in Grahamstown, whereupon I spent five weeks at the University of the Witwatersrand where I was delighted to find a most liberal and progressive faculty and a very alert student body that is fully aware of the urgent problems of the day. In Pretoria it was my privilege to deliver a lecture under the auspices of the Ministry of Education, and my official tour ended in Natal where I addressed the Pietermaritzburg and Durban Branches of Natal University College.

But this was not all. Upon invitation of the *South African Medical Association* I had an opportunity to meet the members of seven

* A Farewell Address broadcast from the Cape Town Studio of the South African Broadcasting Corporation on December 11, 1939.

local branches and to discuss problems of medical economics with them. Student groups, Left Book Clubs, and other organisations wanted me to address them, so that I actually gave 49 lectures instead of the originally scheduled 19, and I admire the patience with which you have listened to my sometimes lengthy disquisitions.

My field of research, the history and sociology of medicine, is rather unusual and my university, Johns Hopkins, is one of the few that has a full chair and an organised department devoted to these subjects. Why should anyone, we hear, investigate the past of medicine? Is the history of medicine more than the history of human errors and failures? Did not scientific medicine begin only yesterday? A study of the past of medicine, however, has not only cultural value. It teaches us where we came from, at what point of development we stand to-day, and what our future tasks will be. It helps us to understand the many urgent social problems that medicine has to face. It is not enough to know about disease. We must be able to apply whatever knowledge we have for the benefit of all members of society.

When I landed in Cape Town I was rather apprehensive and was not at all sure that my studies would interest South African audiences. I was familiar with the excellent studies of Dr. Laidler on the history of South African medicine, and also with the activities of a student group in Johannesburg. But I was aware that as a whole the subject was new to South Africa. Nothing could have been more gratifying to me than to see what lively response my lectures found all over the country.

I came, however, not only to teach but also to learn. South Africa and the United States have a great deal in common. They are both large and young countries, thinly populated, so that we have by necessity a great many problems in common. Wherever I went I visited medical institutions, such as hospitals, health centres, and laboratories, and it was a great pleasure to be able to talk to a large number of medical officers and practitioners. Since I am particularly interested in rural health problems—one of the most difficult and most urgent problems in all countries—I made motor trips through Zululand, the Transkei, and other rural sections, and the fact that I reached Cape Town without breaking my neck proves that the roads

are better than their reputation. Yours is a beautiful and also a healthy country. If it were not, most of the native population would have died out long ago.

In the development of medicine of every young country three stages can be observed. In the beginning the nation is ready to accept scientific medicine but has not the institutions available to train its own doctors, so that young people desiring to enter the medical profession are obliged to study abroad. This was the case in America, and until recently in your country also. In the second stage the country begins to develop its own schools, but still has to import teachers from abroad. And in your two medical schools you still have a large number of professors who came from British universities. Speaking with my colleagues I sometimes had the impression of being not in South Africa but in Edinburgh. The third stage is reached when the country begins to produce its own physicians and medical teachers, and when the medical schools from being merely teaching institutions become centres of research. I was glad to see that you are gradually reaching this stage. I visited Onderstepoort, a biological research centre of world reputation, founded by Sir Arnold Theiler and now so ably directed by one of your own sons, Dr. Du Toit. I also visited the Institute of Medical Research in Johannesburg, from which valuable contributions have come, and I have no doubt that research will play an increasingly important part in the universities. *The Journal of Medical Sciences*, which is well known abroad, is a vivid testimony to this. Due to the racial mixture of the population the country is full of most interesting biological and medical problems, so that South Africa presents an ideal field to the medical researcher.

This trip was particularly interesting to me since the population of the country has a social and economic structure that is totally different from that of any country I had visited in the past. It seems to me that the general health situation is determined by the fact that two million Europeans live side by side with about eight million non-Europeans whose material standard is extremely low. We all know that there is a direct correlation between poverty and the incidence of illness. It is no wonder, therefore, that tuberculosis, venereal diseases, and malnutrition, with all its dire consequences,

play havoc in the non-European population. It is very regrettable that vital statistics are not available for the native population. But according to conservative estimates more than half of all the children born never reach the age of maturity. It is to be hoped that vital statistics of the native population will be introduced in a not too distant future. From what I saw in the native reserves the machinery to collect statistical data is available, so that the task should not be too difficult. And since the wealth of the country is created by native labour it would be in the interests of all, not only of the health workers, to have statistical figures available.

Disease knows no colour bar, and a sick native population is not only an economic handicap, but a direct menace to the health of the Europeans. It is perfectly obvious that the non-Europeans are too poor to purchase medical services, so that there is only one possibility to improve health conditions, namely through the development of State services. I saw promising beginnings in the Transkei, where every magisterial district has a district surgeon, and where twenty rural clinics with native nurses are being established. Much remains to be done, however, and it is obvious that 64 physicians cannot possibly serve a population of 1.3 million.

In the cities conditions are somewhat different. The 300,000 native mine workers of the Rand are fed scientifically and have organised medical services. This is a demonstration of the fact that money spent to improve health conditions pays large dividends. Outside the mines, however, conditions are much less satisfactory. I visited the native locations of all the cities that I touched on my tour, and found them very different. Some, like that of East London, are atrocious, breeding places of disease, and it is only to be hoped that conditions will be improved without waiting for the outbreak of major epidemics. Others, like the new location of Port Elizabeth, are infinitely better. Health services are, in most locations, quite inadequate. I was struck by the fact that the native has become health conscious and hospital-minded. I hear that ten years ago natives had to be dragged into the hospital, while now they flock to it. Wherever I visited non-European wards I found them overcrowded—a very promising sign because it shows that the native has confidence in scientific medicine. But it is obvious that infinitely more accommodation will have to be provided.

The health problems of the European population are somewhat easier to solve, and statistics show that health conditions of this section of the population are as good as those of most European countries. Poverty of the population, however, presents health problems in this section also. Thanks to your very well-drafted Slum Clearance Act progress is being achieved, and I was very interested to see the sub-economic housing schemes of many cities. They undoubtedly are an important step in the right direction, although they do not remedy the basic evil, low wages. In every country society should realise that there is a minimum income under which no family can lead a decent and healthy life. If this minimum is not provided by wages, somebody has to make up the balance. It may be the community, by building sub-economic houses, distributing milk, and similar measures. Or if this is not done, illness and crime result and the community has to pay for hospitals and gaols.

One way of financing medical services is through insurance. The European mine workers, the railway workers and those of many industries have their benefit societies. I studied the Colley Report on national health insurance, and I have no doubt that such a scheme would reach groups such as the clerical workers, who so far have no organised medical services and find it difficult to budget the cost of illness. Health insurance, however, cannot be a national solution of the problem in a country in which over eight-tenths of the population is too poor to pay insurance premiums. It seems to me, therefore, that the only possibility of bringing health to all the people of South Africa, irrespective of race and income, is the gradual development of public services. This is by no means a revolutionary step, because the country already has extensive state medical services. The cities have their medical officers of health, the districts their district surgeons. Free clinics are available in many places. The task would be to develop the existing organisation more and more, so that it would gradually reach the whole population.

I was greatly interested in the Free Hospitalisation Scheme that is being discussed so eagerly in the Transvaal today. The hospital is playing an increasingly important part in our medical life, and if hospital service and out-patient department service become available to all free of charge this will become a tremendous step in the development of state medicine.

South African medicine has progressed enormously in a very short period of time. You already have two flourishing medical schools, and I hear that a third school will be established in Pretoria in the near future. I wish you would consider a fourth school, perhaps in Durban, for the training of fully qualified non-European physicians.

You already have many excellent hospitals that compare very favourably with the best hospitals of America. Your own Groote Schuur hospital is an example, and the new hospital in Pretoria is a beautiful and splendidly equipped institution. But still more hospitals and sanatoria are needed, particularly for the non-European population.

You have an excellent medical corps, serving the people with great enthusiasm, and I particularly enjoyed my contacts with your medical officers of health, whom I found a most progressive body, fully aware of their great responsibilities. But there is no doubt that many more doctors, nurses, and other auxiliary personnel are needed if you remember that you are a nation, not of two, but of ten million inhabitants.

Every health programme costs money and requires sacrifices from those who have the money, but there is no better investment than that in health.

I have spent a most happy time in South Africa, and I am sorry to leave your beautiful country and its hospitable people. I have been so fascinated by your many problems that I shall keep in close touch with developments here, hoping that I may be able to come back for a second visit some day. Once more I wish to thank you all for the kind reception you have given me everywhere, and I am particularly grateful to the Graduate Association in Johannesburg, upon whose initiative I was invited to this country, and to the University of the Witwatersrand that has admitted me among its honorary graduates.

I want you to know that you have one more friend in the United States, who will always be glad to welcome visitors from South Africa.

THE SKELETAL AND DENTAL PATHOLOGY OF AN EARLY IRANIAN SITE

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Foreword

In 1931 the University of Pennsylvania excavated a prehistoric site at Tepe Hissar, Damghan, Iran, at the southeastern end of the Caspian Sea. The skeletal material was sent to me in 1936 at Western Reserve University, where I was on the Staff of the Anatomical Laboratory. Photographs were made for me by Miss W. M. Kuenzel.

The dating of the Hissar material on the basis of archeological evidence is as follows: Period I, before 4000 B. C. to *ca.* 3500 B. C.; Period II, *ca.* 3500 B. C. to *ca.* 3000 B. C.; Period III, *ca.* 3000 B. C. to *ca.* 2000 B. C.

The cranial and jaw material studied from the three Periods may be tabulated:

	Children		*Adults*	
Period	*Crania*	*Mandibles*	*Crania*	*Mandibles*
I	1	1	4	4
II	1	—	16	13
III	24	19	138	93
	—	—	—	—
Totals	26	20	158	110

There are 58 skeletons in varying states of completeness: one in Period I, four in Period II, fifty in Period III, three of unknown Period.

The cranial types, studied in detail in as yet unpublished reports, are to be identified as Mediterranean, Proto-Nordic, Alpine and Negroid. This ethnic terminology is used in the pages that follow.

Dentition of the Children

One of the most interesting features to be studied in the children's skulls was the sequence of the eruption of the permanent teeth. The

usual sequence, disregarding upper and lower, right and left, was M 1, I 1, I 2, Pm 1, Pm 2, C, M 2, M 3. This sequence was occasionally replaced by either one of the following, namely, M 1, I 1, I 2, M 2, Pm 1, Pm 2, C, M 3, or M 1, I 1, I 2, Pm 1, C, Pm 2, M 2, M 3. In other words the sequence of premolars, canine and second molar was apparently interchangeable. In no instance did I 1 erupt ahead of M 1, a condition frequently observed among White children of the more privileged social strata. The eruption of M 2 before Pm 1-2 is found also in the Paleolithic children of Weimar and Ehringsdorf, a condition of particular interest because it is reminiscent of the Anthropoid pattern.

The condition of the children's teeth was uniformly good. Caries was noted in only three instances; apical abscesses occurred but twice. Premature exfoliation was rare; one case, 33-23-13, a Proto-Nordic (?) was of interest because of an early loss of the two upper central incisors, which appeared to have been knocked out. The wear of the teeth was excessive; by the age of seven or eight, just before eruption of the premolars, the milk molars were in the fourth degree of wear, i. e., complete loss of enamel from the occlusal surface, with frequent invasion of the pulp cavity. The arches were usually regular parabolas; no crowding or malposition was observed.

Dentition of the Adults

An observation frequently made is that dental pathology is essentially a modern affliction; that back in the " good old days " of prehistory, or in the " natural life " of the primitive peoples, diseased teeth were a rarity, if not, indeed, entirely unknown. Let us see the story told by the Hissar people who lived from 4000 to 6000 years ago.

Incidence of Dental Disease

In going over the crania and mandibulae I have tabulated for every tooth whether it was sound, exfoliated before death or dropped out after death (lost or not recovered during excavation), and whether it was actively abscessed or carious. Obviously such tabulation is much too bulky to repeat here, so we shall discuss it only in summary form.

The number of *individuals* having perfect teeth, and the number with imperfect dentitions—ranging from only one affected tooth to a completely edentulous condition—are given in Table I, for upper and lower teeth. The frequency includes teeth present and actively diseased and teeth exfoliated before death because of a diseased condition (abscess, caries or other pathology).

TABLE I

TOTAL NUMBER OF INDIVIDUALS WITH PERFECT OR IMPERFECT DENTITIONS

	Med.II Male	*Med. II Female*	*Proto-Nordic II-III Male*	*Med. III Male*	*Med. III Female*	*Alpine III Male and Female*	*Negroid Male*
Perfect teeth							
Maxillary	4	4	18	19	14	3	6
Mandibular	2	2	15	8	12	3	4
One to four teeth diseased							
Maxillary	1	—	12	13	7	6	1
Mandibular	3	2	16	13	9	5	6
Five to eight teeth diseased							
Maxillary	1	—	5	7	7	—	2
Mandibular	2	1	2	7	4	—	1
Nine to twelve teeth diseased							
Maxillary	—	2	4	3	3	—	1
Mandibular	—	—	—	3	2	—	—
Thirteen to sixteen teeth diseased							
Maxillary	1	1	3	8	1	1	1
Mandibular	—	—	—	4	1	1	—

Far from having perfect dentitions, the several types, in their respective Periods, have an unusual degree of diseased teeth. For the maxillary teeth only 57% of the Hissar II Mediterranean males have perfect teeth; 57% of the Hissar II Mediterranean females; 43% of the Hissar II-III Proto-Nordic males; 38% of the Hissar III Mediterranean males; 44% of the Hissar III Mediterranean females; 30% of the Alpine III males and females; 55% of the

Hissar III Negroid males. For the mandibular teeth the percentage frequencies of perfect teeth are 29%, 40%, 45%, 23%, 43%, 33%, and 36%, respectively. The Mediterranean type has the highest frequency of dental disease, and the mandibular teeth seem to be more frequently affected than the maxillary.

In Tables II and III are summarized the frequency of dental disease in *each tooth*, maxillary and mandibular, right and left, expressed in percentages of the total number. Again the Mediterranean type leads, and again the mandibular teeth are seen to have a higher rate of disease. For individual teeth the frequency order is second molar, upper and lower, first molar, upper and lower, with third molar, first premolar, second premolar, uppers and lowers, grouped in frequency.

TABLE II

FREQUENCY OF DENTAL DISEASE IN MAXILLARY TEETH
(in percent)

	Med. II Male	*Med. II Female*	*Proto-Nordic II-III Male*	*Med. III Male*	*Med. III Female*	*Alpine III Male and Female*	*Negroid Male*
Central incisor, right	25.0	14.0	16.6	16.9	18.4	18.9	16.6
Central incisor, left	28.5	14.0	23.2	22.1	12.1	20.0	18.1
Lateral incisor, right	14.3	14.0	11.9	24.0	9.3	20.0	15.3
Lateral incisor, left	14.3	14.3	14.2	31.4	24.9	20.0	9.0
Canine, right	25.0	28.5	13.9	20.9	5.8	10.0	16.2
Canine, left	14.3	14.3	15.9	26.4	13.2	10.0	8.3
First premolar, right	14.3	28.5	19.0	28.2	14.7	18.1	27.0
First premolar, left	14.3	43.0	16.2	21.5	9.3	10.0	16.6
Second premolar, right	28.5	28.5	16.5	23.5	14.2	11.0	25.0
Second premolar, left	28.5	28.5	19.0	19.2	9.3	10.0	16.6
First molar, right	25.0	42.9	33.2	28.5	27.2	20.0	33.3
First molar, left	37.5	43.0	27.2	33.3	23.4	10.0	18.1
Second molar, right	14.3	42.9	24.4	38.7	25.6	16.2	18.2
Second molar, left	14.3	43.0	31.1	31.4	26.6	20.0	25.0
Third molar, right	28.5	37.5	26.0	32.0	29.4	18.1	18.2
Third molar, left	——	43.0	20.6	28.8	27.2	20.0	27.2

TABLE III

FREQUENCY OF DENTAL DISEASE IN MANDIBULAR TEETH
(in percent)

	Med. II Male	*Med. II Female*	*Proto-Nordic II-III Male*	*Med. III Male*	*Med. III Female*	*Alpine III Male and Female*	*Negroid Male*
Central incisor, right	14.3	—	6.0	23.3	10.7	22.2	9.0
Central incisor, left	14.3	—	3.0	22.8	14.2	22.2	9.0
Lateral incisor, right	14.3	—	—	17.0	14.2	11.0	—
Lateral incisor, left	14.3	—	—	19.9	7.1	11.1	9.0
Canine, right	—	—	—	17.0	13.7	11.0	—
Canine, left	14.3	—	—	14.6	7.1	22.2	—
First premolar, right	—	—	5.8	28.4	14.2	11.0	16.6
First premolar, left	28.5	—	—	24.9	3.5	11.0	16.2
Second premolar, right	14.3	—	9.0	17.1	21.4	11.1	9.0
Second premolar, left	14.3	—	5.8	27.7	14.2	11.1	18.1
First molar, right	14.3	40.00	20.9	37.2	28.5	30.0	18.0
First molar, left	25.0	—	19.9	36.0	27.4	22.2	9.0
Second molar, right	14.3	20.00	9.0	54.0	24.9	11.0	9.0
Second molar, left	—	—	9.3	42.4	17.8	11.1	—
Third molar, right	28.5	20.00	11.7	44.0	32.0	22.0	—
Third molar, left	28.5	24.00	14.7	45.6	37.8	11.1	18.1

Certainly, in frequency of dental pathology the Hissar population was not "primitive"! In a previous study, however, I have shown that dental disease is not so rare among prehistoric and primitive peoples as generally believed.* The people at Tepe Hissar confirm this viewpoint.

The Wear of the Teeth

Obviously, since the Hissar population was essentially a young one, with age-peaks in the third-fourth decades, excessive wear cannot be taken as a criterion of age. The teeth of the adults were excessively worn. If *Stage 3* of wear be defined as a general exposure of the dentine on the occlusal surface of the tooth, and *Stage 4* as total loss of enamel on the occlusal surface, with frequent invasion of the pulp cavity, then the average wear of maxillary and mandibular teeth may be summarized as follows:

* Krogman, W. M., "The rôle of urbanization in the dentitions of various population groups." *Zeitschr. f. Rassenkunde* 7 (1) : 42-72. 1938.

	Med. II Female	*Med. II Male*	*Proto-Nordic II-III Male*	*Med. III Male*	*Med. III Female*	*Alpine III Male and Female*	*Negroid III Male*
Maxillary	3.4	3.3	3.5	3.5	3.1	3.2	3.5
Mandibular	3.3	3.0	3.3	3.4	3.2	3.1	3.1

This marked wear can be ascribed to only one thing, i. e., a coarse diet that probably contained gritty substances. It may be possible that the excessive wear conduced to a general structural breakdown leading to decay.

Impaction and Malposition of Teeth

The impaction of the third molar is regarded as essentially "modern" or "advanced." In the entire series from Tepe Hissar the impaction of $\frac{8|8}{8|8}$ was observed once, of $\frac{8|8}{|}$ fourteen times, of $\frac{|}{8|8}$ eight times, of $\frac{8|}{|}$ twice, of $\frac{|}{8|}$ once, and of $\frac{|}{|8}$ three times.

The impaction of $\frac{3|}{|}$ was noted three times, and of $\frac{|3}{|}$ once. In each instance the deciduous canine was retained in place.

As a general rule the arches, while varying in form, were quite regularly spaced. There were only *ca.* 5% of the total number of adults in whom the anterior teeth were crowded, i. e., where there was a palate constricted anteriorly. The "bite" was generally edge-to-edge.

Shape of the Palatal Arch

The palatal arch, or upper dental arch, was classified as *parabolic,* with premolar-molar row opening out posteriorly; *U-shaped,* with premolar—molar row parallel, and *horseshoe-shaped,* with premolar-molar row closing in posteriorly. The frequencies are given in percentages:

	Med. II Male	*Med. II Female*	*Proto-Nordic II-III Male*	*Med. III Male*	*Med. III Female*	*Alpine III Male and Female*	*Negroid III Male*
Parabolic	57.0	29.0	32.5	36.7	35.5	20.0	36.0
U-shaped	43.0	57.0	55.0	46.9	45.1	50.0	64.0
Horseshoe-shaped	——	14.0	12.5	16.3	19.4	30.0	——

The U-shaped palate, stated to be "primitive," is the most frequent.

In connection with the palate it may be observed that in the entire series the *torus palatinus* occurred nineteen times, six times in females, thirteen times in males. In only two males was it developed to an excessive degree.

It has been noted that in *ca.* 5% of all adult crania there was a tendency to an anterior constriction of the palate, leading to a relatively crowded condition of the incisor-canine area. Where this condition occurred it was not accompanied by the high, narrow Λ-shaped palate found so frequently, according to Keith, among modern leptoprosopic Englishmen, and presumably attributable to the imbalance of urban existence. The Hissar palate, though it generally had a parallel premolar-molar row, was rather widely arched anteriorly, was vaulted evenly, and was only of moderate depth.

Summary of Dental Pathology

In summary of the dentition of the peoples at Tepe Hissar it may be observed that dental disease was present to a rather high degree. In this, and in the frequency of impacted teeth, the population differed only in degree with many peoples of today. The excessive wear of the teeth is probably attributable to gritty food. In the eruption-pattern of the permanent teeth, and in the form of palatal arch, there is some evidence of the retention of primitive features.

Bone Pathology of the Peoples at Tepe Hissar

It is an expected hazard of every-day life that occasional injuries be incurred. Especially is this true of a primitive people among whom the struggle for existence is one of more intimate and vigorous contact with the forces of nature. The population at Tepe Hissar is a true cross-section of an early, primitive community, and the size of the sample offers a unique opportunity to read from the bones some record of the bodily vicissitudes suffered by them.

Pathology of the Cranium and Face

One of the most startling conditions is that shown in Fig. 1, the facial view of 33-23-36, a male of Mediterranean type from Hissar

Fig. 1.

Photograph of cranium of 33-23-36. Mediterranean male type of Hissar III, showing destruction of left side of face.

II. An extensive inflammatory condition has destroyed the left half of the face, involving left maxilla, left palatine, left zygoma, extending onto the floor of the orbit. The left maxillary sinus is completely obliterated. The floor of the nasal fossa is penetrated, a condition which extends to the right of the midline. All upper teeth on the left side are gone, as well as the right central incisor; the upper teeth that remain are in the fourth stage of wear, and the second premolar has an apical abscess that has invaded the right maxillary sinus. At first glance the injury looks as though it had resulted from a spear-thrust, arrow-wound, or blow from a club. The mandible, however, is intact, a fact which inveighs against such an interpretation. It may be conjectured whether the condition is primarily due to sinus infection, brought about by dental disease.

In 33-23-168, a Negroid male of Hissar III, there is marked inflammation of both mandibular fossae, breaking through the tympanic plate on both sides. The fossae have been shallowed and greatly lengthened in an antero-posterior direction. Unfortunately both mandibular condyles have been broken off, but there is evidence of considerable absorption on both coronoid processes. The teeth are severely worn and badly decayed. Judging from the wear of the lower teeth the temporo-mandibular movement has been very erratic. The etiology of the condition is doubtful; it may be arthritic in origin. No other parts of the skeleton are available.

In 33-23-35, a female of Mediterranean type from Hissar II, there is hypertrophy of the middle turbinate on the right side. The condition is unusual in the Hissar crania, and is considerable in extent even in comparison with what may be found in a series representative of a modern population. The septum has a curved deflection to the opposite side.

We now come to evidence of cranial injuries which may be interpreted as due to blows sufficiently violent to cause local inflammation, but not enough to cause fractures, and certainly not violent enough to cause death. These *head-wounds* are equally distributed among individuals of both Mediterranean and Proto-Nordic types, but are about three times more frequent in males. The parietals are usually affected. We shall first consider the Proto-Nordic crania.

In 33-23-26, male of Hissar II, there is an area on the right

parietal 18 mm. x 20 mm., *ca.* 1 mm. in depth, 10 mm. to the right of bregma. The area is completely healed, but all around it there is evidence of increased vascularity.

In 33-16-15, male of Hissar III, there is an old healed fracture over the left parietal eminence. The scar is semilunar in shape, opening medially, and is *ca.* 60 mm. in length.

In 33-16-71, male of Hissar III, there is an area 11 mm. x 13 mm., 2 mm. in depth, located on the left parietal 25 mm. above the squamous suture and 15 mm. behind the coronal suture. This scar looked as though a blow with a pointed instrument may have been the cause.

In 33-23-96, male of Hissar III, there is an area on the frontal 10 mm. x 10 mm., very superficial, 30 mm. in front of bregma and 15 mm. to the left of the mid-line.

In 33-23-107, male of Hissar III, there is an area on the left parietal eminence 10 mm. x 11 mm., 1 mm. in depth. Adjacent to it are seven grooves which look like " cuts," but which (see also 33-23-104) appear to be linear scorings due to hypervascular channeling.

In 33-23-213, female of Hissar III, there is a large area just back of the right parietal eminence 34 mm. x 18 mm., 2 mm. in depth.

We turn now to the Mediterranean crania.

In 33-16-66, male of Hissar III, there is an area on the frontal 21 mm. x 18 mm., 1 mm. in depth, 25 mm. in front of bregma in the mid-line.

In 33-16-133, male of Hissar III, there is an area on the frontal 8 mm. x 11 mm., 1 mm. in depth, 50 mm. above glabella in the mid-line. Along the sagittal suture, in its second and third parts, there is a marked depression *ca.* 2 mm. in depth, extending 10 mm. on either side of the mid-line.

In 33-16-196, male of Hissar III, there is an area on the frontal 17 mm. x 11 mm., 2 mm. in depth, 15 mm. in front of the coronal suture and 10 mm. to the left of the mid-line.

In 33-23-104, male of Hissar III, there are on both parietal eminences a series of grooves (see 33-23-107) which at first glance appear to be " cuts." Since the area on each side is generally very vascular, and since the " cuts " are not straight—as if made by a sword—it is probable that the grooves are vascular in origin.

In 33-23-183, male of Hissar III, there is an area on the right parietal 7 mm. x 7 mm., 2 mm. in depth, 17 mm. behind the coronal suture and 21 mm. to the right of the mid-line.

In 33-16-88, female of Hissar III, there is an area on the frontal 10 mm. x 8 mm., very superficial, 15 mm. in front of the coronal suture and 33 mm. above the fronto-temporal suture.

In 33-23-150, female of Hissar III, there is an area on the left parietal 27 mm. x 21 mm., 2 mm. in depth, to the left and just behind the parietal foramen. It is very granular in appearance.

The cause of these head injuries must remain conjectural. They are hardly serious enough to indicate a battle; they may point to a quarrelsome folk among whom a hearty thwack on the head was the quickest means of settling an argument; or they may arise from a venturesome spirit that led to disputes over rights of way.

In two Mediterranean crania of Hissar III there are conditions calling for special note. In male 33-16-93 there is, on the upper part of the squama occipitalis, an old healed lesion suggestive of the vascular pitting sometimes found in nutritionally defective children. In female 33-23-66 there is a sparse exuberant deposit *ca.* 20 mm. x 25 mm. arranged in ridges parallel to and involving the serrate portion of the sagittal suture in the region of obelion. The area carries the impression of being a diffuse haematoma, but lacks the peripheral crater-like rampart.

On five of the crania from Tepe Hissar III there are *exostoses* varying in size and in position. Their cause is unknown.

In 33-16-66, male Mediterranean of Hissar III, there is at stephanion, on the right side, a small nodular exostosis measuring 10 mm. x 15 mm., 4 mm. in height.

In 33-16-196, male Mediterranean of Hissar III, there is at a point 45 mm. in front of the coronal suture and 10 mm. to the right of the mid-line, a small nodular exostosis 15 mm. x 15 mm., 1 mm. in height.

In 33-23-104, male Mediterranean of Hissar III, at the site of the parietal foramina are bilateral exostoses *ca.* 10 mm. x 5 mm., 1 mm. in height.

In 33-23-119, female Mediterranean of Hissar III, there are about 15 small nodules in the region of ophryon covering an area *ca.* 40 mm. x 50 mm. They are from 1-2 mm. in height.

In 33-23-168, male Negroid of Hissar III, there is a huge exostosis just to the right of inion, on the linea nuchea suprema. It measures 30 mm. x 32 mm. and projects *ca.* 26 mm. Since the skull is generally quite massive this may be an exuberant expression of the general ruggedness of all muscle attachments.

A single cranial fragment, belonging to 33-16-132, male Mediterranean of Hissar III, is identified as belonging to the left parietal, bordered anteriorly by the coronal suture and medially by the sagittal suture. At the posterior margin of the fragment, corresponding in position to the parietal eminence, there is a necrotic area which has completely penetrated the bone. Just anterior to this perforation, on the endocranial surface, is a second area of necrosis which has involved only the tabula interna. The endocranial aspect is generally hyper-osteoporotic. The bone itself averages 4 mm. in thickness. There is no evidence of healing, nor does the penetration appear to be the result of a violent blow. As far as one can judge from bony evidence alone the lesion " looks like " syphilis in origin.

In four crania there are ***accessory condylar facets***. In 33-23-26, male Proto-Nordic of Hissar II, they are bilateral. In 33-16-118, male Mediterranean of Hissar III, there is a single facet, just to the left of basion. In 33-23-19, female Mediterranean of Hissar III, there is a prominent mid-line third condyle.

Certain other cranial anomalies, not strictly pathologic, may be mentioned here. In all of the Tepe Hissar I-III crania the *os epipteric* was bilateral three times, unilateral on the right seven times, unilateral on the left five times. A large *Wormian bone* was found at lambda eleven times, the *os bipartitum* two times, the *os tripartitum* once. The *metopic suture* was completely patent four times, patent in its upper third or fourth three times, patent in its lower fourth once.

A very unusual cranium is that of 33-23-60, a male (?) Mediterranean type from Hissar III. This is of a child *ca.* six years of age, judging from union of occipital elements. The base of the skull is damaged and the entire face is missing. The coronal and lambdoid sutures are patent and very simply serrated. The sagittal suture is completely obliterated. As a result the cranium is microcephalic (length 145 mm., breadth 105 mm., index 72.41). The vault is

very asymmetrical, with a pronounced frontal eminence just to the left of the mid-line and a " keel " at the site of the closed metopic suture. On the left parietal, just to the left of the mid-line, there is another marked elevation which is occasioned by a " piling up " up to bone to a thickness of 10 mm. Seen from above the skull is an irregular oval, with rather a pronounced post-orbital constriction. The supraorbital ridges are rather prominent for a child, but the prominence is enhanced by under-development of the supraglabellar area. The pterion is H on both sides. This cranium represents a remarkable instance of arrested expansion. It is very asymmetrical in development, both in cranial form and cranial thickness. The left side is higher, narrower and thicker than the right so as to give a superficial resemblance to hemihypertrophy. It is planned, at a later time, to make an endocranial cast and a study of the cerebral morphology thus revealed.

The people of Tepe Hissar experienced their full quota of head ailments (in addition to bad teeth): sinus trouble, occluded nasal passages, head injuries, and certain undiagnosed bony lesions.

Pathology of the Long Bones

The most frequent pathologies that occur in the long bones are those of *fractures* and *arthritic changes*. We shall consider them in this order.

There are four cases of fracture of the femur, one of the tibia, one of the fibula and two of the radius.

The right femur of 33-16-40, male Mediterranean of Hissar II, has a healed subtrochanteric fracture with marked callus formation, especially antero-medially. The entire bone, as is true of the left femur also, is unusually heavy. Both femorae are incomplete, but the right femur was obviously greatly shortened. (See Fig. 2a.)

The left femur of 33-23-20, male Mediterranean of Hissar II, has a healed fracture at mid-level of the shaft with an overriding of *ca.* 75 mm. There is very extensive callus formation, with areas of hyper-vascularity and multiple sequestrae. The displacement has been lateral, with a forward inclination of the upper portion. (See Fig. 2d.)

The left femur of 33-16-52, male Mediterranean of Hissar III,

has a healed fracture extending obliquely from greater to lesser trochanter. There is much callus formation. The neck is greatly shortened, is almost horizontal, and is directed medially and backward so that the thigh must have been rotated laterally. The entire

Fig. 2.

Photographs of healed fractures of femora: *a*, 33-16-40; *b*, 33-23-191; *c*, 33-16-52; *d*, 33-23-20 (left to right).

shaft is excessively curved, as is true also, though to a lesser degree, of the right femur. There are no appreciable compensatory changes in the left tibia. (See Fig. 2c.)

The left femur of 33-23-191, female Mediterranean of Hissar III, has a healed subtrochanteric fracture with excessive callus forma-

tion. The portion above the fracture is deflected anteriorly. The neck of the femur is greatly shortened and is almost horizontal. There is an accessory articular surface on the lower lip of the left acetabulum. Right and left tibiae are not significantly different. (See Fig. 2b.)

The right tibia of 33-16-69, male Mediterranean of Hissar III, has a healed oblique fracture in the lower one-third. There is a very slight deviation and only moderate callus formation.

The right fibula of 33-23-130, male Mediterranean of Hissar III, has a healed fracture in the mid one-fourth of the shaft. The bone has not been much shortened and has remained straight. Callus formation has been moderate; the adjacent area is extremely vascular, possible evidence of fairly recent healing.

The right radius of 33-16-5, female Mediterranean of Hissar I, has a healed fracture *ca.* 1″ above the distal end, with displacement laterally and forward. The styloid process is markedly deflected. (See Fig. 3b.)

The left radius of 33-16-99, female Mediterranean of Hissar III, has a healed oblique fracture in the lower one-third, with displacement laterally and forward. (See Fig. 3a.)

The evidence of arthritis in the long bones is startling enough, but, since there are far more crania in the series, it is proper at this point to discuss arthritic change in the atlanto-occipital and temporomandibular articulations.

The occipital condyle showed evidence of arthritis ("lipping") as follows: Hissar II, one case in a Mediterranean male; Hissar III, seventeen cases in Mediterranean males, nine cases in Mediterranean females, sixteen cases in Proto-Nordic males, and four cases in Negroids and round-heads. The mandibular condyle was "lipped" in nine cases in the entire series. In 47 crania, more than 25%, there was evidence of arthritic changes at an average age of 30 ± 3 years! It is perhaps not too much to state a correlation between the high incidence of dental disease and arthritic changes in the skeleton.

The majority of the adult skeletons show arthritic lipping to a greater or lesser degree, e. g. 33-16-143, male Proto-Nordic of Hissar III, and 33-16-67, male Mediterranean of Hissar III. In

these skeletons long bones, vertebral column and foot bones present definite evidence of arthritis. In Figure 4 are pictured both femora

Fig. 3.

Photographs of bone pathology: *a*, healed fracture of radius in 33-16-99; *b*, healed fracture of radius in 33-16-5; *c*, pyogenic infection of femur in 33-16-69; *d*, osteomyelitis (?) in tibia and fibula of 33-23-94 (left to right).

and tibiae and the right talus, calcaneus, navicular and cuboid of 33-16-112, male Mediterranean of Hissar III. At the knees there is

Fig. 4.

Photograph of right and left femora and tibiae and right talus, calcaneus, navicular and cuboid of 33-16-12 to show arthritic changes.

excessive lipping, and the antero-lateral aspect of the lateral condyles of both femora are eburnated and deeply grooved. The tarsals, especially those figured, are so modified as to lose their characteristic shapes. In Figure 5 is shown the right hip-joint of 33-16-64,

Fig. 5.

Photograph of arthritic changes in right hip-joint of 33-16-64.

male Proto-Nordic of Hissar III. The rim of the acetabulum has been built up *ca.* 25 mm., and there is an extensive deposit on the head of the femur with a large spicule on the inferior aspect. This spicule was so related to the acetabular notch that movement was greatly restricted; the thigh must have been permanently semi-flexed. There has been calcification of the tendon of the oblique

head of the *M. rectus femoris*, with a resultant accessory joint facet on the medial aspect of the neck of the femur. In general the pelvic bones are studded with spicules of bone.

The left tibia and fibula of 33-23-94, male Mediterranean of Hissar III, may represent arthritic modifications or may represent *osteomyelitis*. The lower one-third of the tibia is symmetrically thickened so that it is almost round, measuring 42 mm. anteroposteriorly, 36 mm. laterally. The fibula is thickened to within 50 mm. of its proximal end, and at mid-level, where it is irregularly thickened, it has many spicules of bone. Both tibia and fibula are united distally, including the talus which has lost all semblance of its former shape. There are no sequestrae. No other bones of the skeleton are affected. (See Fig. 3d.)

The right femur of 33-16-69, male Mediterranean of Hissar III, has its head, neck and adjacent shaft absorbed by a pyogenic infection which indeed greatly resembles *tuberculosis*, but at least is evidence of mixed infection. The distal ends of both the right and left femora show arthritic lipping. (See Fig. 3c.)

In 33-23-120, male Mediterranean of Hissar III, both tibiae, in the lower one-third, show a proliferate periostitis characteristic of the early stages of a chronic varicose ulcer. There has been no great enlargement of the leg.

There remains but to mention three cases of unilateral shortening of the humerus which may represent a hereditary familial condition.

In 33-23-48, male Mediterranean of Hissar III, the right humerus is shorter than the left (max. length R = 192.00 mm., L = 294.00 mm.). The proximal end is greatly modified and the portion of the bone above the massive deltoid tuberosity is deflected backward. The distal ends of the right and left humeri do not differ greatly in size (bicondylar breadth R = 64.00 mm., L = 63 mm.) with the exception that the right medial epicondyle is disproportionately large. Of the two ulnae that are present the right is much more slender than the left. (See Fig. 6b.) At mid-level of the shaft of the left ulna there is a symmetrical swelling which "looks like" *luetic periostitis*. It may, however, be merely the smooth regular callus of a well-healed fracture.

In 33-23-106, male Mediterranean of Hissar III, the left humerus

is shorter than the right (max. length R = 302.00 mm., L = 224.00 mm.). The head, neck and tuberosities have been absorbed and a secondary joint formed. There are no modifications of the distal

Fig. 6.

Photographs of unilaterally shortened humeri: *a*, 33-23-106; *b*, 33-23-48; *c*, 33-23-150, with right and left scapulae (left to right).

portion of the bone (bicondylar breadth R = 56.00 mm., L = 59.00 mm.), with the exception of an enlarged medial epicondyle. (See Fig. 6a.) Both radii and ulnae are present and do not differ in size and proportion.

In 33-16-150, female Mediterranean of Hissar III, the left humerus is shorter than the right (max. length R = 269.00 mm., L = 189.00 mm.). The proximal end is greatly modified by absorption. The deltoid tuberosity is very strongly developed and above this level the bone is bent medially and backward. The distal halves of the two bones are not greatly different (bicondylar breadth R = 56.00 mm., L = 58.00 mm.), with the exception of a very large medial epicondyle on the left humerus. In this instance the scapulae are present; the glenoid fossa of the left scapula has been modified into an irregular joint cavity. The proportions of the scapulae are not otherwise changed. (See Fig. 6c.) The right and left ulnae are present but do not differ in size or proportions.

If these three shortened humeri, for which a congenital condition has been suggested, are placed so that the respective nutrient foramina are at the same level, the affected bone seems to be symmetrically shortened (see Fig. 6a, b, c), i. e. the distal half is relatively short also; in other words, the shortening is not merely due to absorption of the proximal one-half. In a congenital condition, however, one might expect disuse atrophy on the affected side; in no instance do the radius and ulnae on that side show changes traceable to disuse. Presumably the shortened arm has functioned. It may be suggested that we have to deal with fractures of the head and neck, or slipped proximal epiphyses, leading to absorption and consequent modification, but the obvious symmetry of the length relations of the bones hints at a congenital condition.

In summary of the bone pathology at Tepe Hissar we may observe that in addition to the less frequent and more striking lesions already mentioned we meet the usual assortment of pyogenic infections, unreduced fractures and arthritis of advancing years.

Illness as registered in the teeth and bones must have taken its toll. The early average age at death of only 35 ± 3 years at Tepe Hissar takes on a new meaning as we realize that disease and injury must have played a significant rôle in the life of this prehistoric people.

MEDICINE IN INDIA IN THE MIDDLE OF THE XVI CENTURY [1]

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The object of this paper is to present briefly a cross-section of Medicine in the middle of the 16th century, chiefly based on the first European medical book published in India [2] by a successful, experienced and scholarly Portuguese physician, Garcia de Orta, who practised in India for more than a quarter of a century and had unrivalled opportunities of coming into contact with Princes and pandits, physicians and patients, belonging to different parts of India.

Medicine Four Hundred Years Ago

Before attempting to indicate even briefly the chief features of the theory and practice of medicine in India in that epoch, it is desirable to have a clear conception of the art and science of medicine at the time in Europe.

It is no exaggeration to say that at the beginning of the 16th century, medicine, whether Occidental or Oriental, consisted in what Ruano (a character in the book) defines as the object of his visit to India, as well as the object of the book by Orta:—viz "To learn

[1] A paper read in the Medical Section of the Indian Science Congress, held at Lahore, January 2nd to 9th, 1939.

[2] The work was completed and published at Goa by "Johannes de Endem" on April 10, 1563. The title was "*Coloquies dos simples e drogas e cousas medicinais da India compostos pello Doutor Garcia da Orta.*" The first edition is exceedingly rare. It is full of typographical errors, being the third book ever printed in India. Orta's book seems to have been popular and widely circulated. Classius made a sort of epitome in Latin in 1567 (Antwerp) and it went through many editions by the end of the century. This epitome was also highly valued. Annibal Briganti translated the abridged edition of Classius into Italian in 1582 (Venice) while Antoine Colin did it into French (Lyons 1619). The standard edition of Garcia da Orta is by Count Ficalho (in two volumes), first published in 1891, with full and admirable notes to each colloquy. This is now available in an English translation by Sir Clements Markham (Henry Southeran & Co., 43, Piccadilly, London W. & 140, Strand, London, 1913). For a fuller table of Contents of the Book, the reader may refer to my article on "Garcia da Orta" in *The Annals of Medical History.*

about the drugs of India and about all other simples; To know about the medicinal drugs and other medicines and To know how the native physicians use them." This suggests that emphasis was laid more on actual drugs and methods of relief, rather than on other theoretical aspects of medicine. The mediaeval universities of Europe were, however, still teaching the academic and theoretical aspects. Ruano asks Orta, " Will you refer to what is said on the subject by Greek, Latin and Arabian writers and tell me whether they are right and where wrong and above all, your opinion and what has come to your knowledge? "

It may be noted here that some of the medical classics were first printed and published in the latter part of the 15th century; the Latin edition of Celsus in 1478 (Florence); The Canon of Avicenna in 1479; the works of Rhazes in 1480 (Venice); and Aldine Edition of Theophrastus in 1497. Linnacre published the translations of Galen between 1517-1524. Both the Greek and Latin texts of Hippocrates were published about 1525. The writings of Paul of Aegina were printed in 1528. Orta also quotes these ancient authors and also many new and recent writers, among whom may be mentioned, Mesue, Sylvaticus, Nicholas Leonicenus, whose learned commentaries were also printed at the close of the 16th century. The first official pharmacopoeia (Florence) was published in 1498 and an Atlas of plants was printed in 1530 A. D.

Defective Knowledge of Ancillary Sciences

Anatomy and Physiology, as are known today were yet in the womb of Time. The old Galenic views on the structure and functions of the organs in the body were still unchallenged. In Britain, the statute permitting 4 dissections annually was passed only in 1540. The anatomical theatres of Padua, Paris and Montpellier came into existence only after 1549. It is curious that Orta does not even allude to the laborious dissections of Vesalius or that Master's epoch-making book " The Fabric " published in 1543, entitling Vesalius, to be called the Father of Modern Anatomy. Physiology was still a mixture of a few ancient observations with a mass of fanciful hypotheses. Tradition and dogma were still supreme dictators in medical thought and practice. The value of experiment and observa-

tion to the student of physiology were yet unrecognised. In 1578, was born William Harvey, who by his experiments, his teaching, and his great work " De Motu Cordis " started a revolution in the sphere of medical knowledge. Meagre was the knowledge of morbid anatomy and the pathological changes preliminary to or consequent on disease. Microscope, the hand-maid of Medicine, was not yet born. Ill-health and sickness were still believed, as is now done in Ayurvedic circles, to be due to the sudden or gradual upset of the equilibrium between the humors of the body. Some diseases were, however, attributed to excessive eating or licentious living. The great epidemics and pestilences, plague and syphilis, were regarded either as the evil consequences of the malevolent influence of certain planets or as visitations of divine wrath for the increasing wickedness or accumulated sins of mankind.

Materia Medica, Terminology (qualities, degrees), Classification

The *materia medica* at the disposal of the physicians of Europe or Asia were nearly the same with slight variations caused by geographical or other local conditions. The terminology used to describe the properties of drugs was still that of the Graeco-Roman and Arab schools. " The first qualities, warmth, cold, humidity, dryness, are caused to a certain degree, and less warmth remits something which in degree causes more warmth. The second and third qualities are aperient and diuretic, more strong and intense being more diuretic; united with other things, becoming less so." Here is a description of Anacardo. " They place it in the fourth, warm and dry, others in the second part of the third; but neither of these satisfy me, for, when green, it is clearly not so warm and dry. It therefore does not appear reasonable to make it as warm and dry as other spices, such as pepper, which is placed in the third degree." Classification of drugs was naturally based upon these properties of drugs. The methods by which the properties of drugs were established savoured more of philosophy and metaphysics than reasoned arguments and experimental proofs or practical observations. Talking of a poison root found in the kingdom of Delhi and called Bacaraga, Orta adds: " It seems to the contrary to all good phi-

losophy, for the root maintains the trunk, the trunk the branches, the branches the fruit, so that the fruit which is an antidote to the poison is maintained by the root which is poisonous. This is contrary to reason. I say so, because the principal base of a serpent's poison is rectified by sixty-three different medicines." Ruano continues the discussion in the same philosophical strain. "If you go by philosophy we find plants and seeds every day which, in their different parts, have different effects. For instance the Zargatoa. Some trees in India have roots, the water distilled from which is very cold, and the bark and seed very hot. Men from Malaca also tell me that the herb which kills, when arrows are anointed with it, has on one side of the tree that looks to the west an antidote, as they told me, while the poison is on the side looking to the east." Orta replies "These materials for simples need not be treated with such subtlety, nor is so much philosophy needed for all can be answered. It is not remarkable that any plant should have the root cold and the leaves and fruit hot; but it is another thing for the root to be poisonous and the fruit fit to eat, and included in the class that may be called nutritive."

Action of Drugs Based on False Anatomy and Physiology

Actions of drugs on the various systems in the body were also based on antiquated false beliefs in anatomy and physiology. Writing on the effects of opium, Orta states: "The imagination respecting the effect of anything helps much in carnal lusts, and as it is superior it gives expulsive virtue; and this imagined power as it is stronger, so it more quickly effects the act of Venus. For the imaginative dominates the expulsive virtue which forces the genital seed, and how much the imagination prevails, so much quicker does the member expel the seed. As those who take opium are beside themselves, the act of Venus comes more slowly. Many females do not give the seed quickly, and when the man is slow, the female also reaches the act of Venus more slowly, so that they both complete the act at one time. The taking of opium assists in the completion of the act of Venus more slowly. The opium also opens the channels by which the genital seed comes from the brain, by reason of its coldness so that they complete the act simultaneously." Again,

while talking of camphor it is said " Much use of the smell of it drying the brain, causes sleeplessness." Orta adds " I have had experience, and see the effects many times and that it causes great pains with the hemorrhage. All this you can do with the aloes, through its bitter quality, opening the veins and stimulating the expulsive virtue. In this way, it purges the bile remaining in the stomach and in the naval, as Dioscorides and Serapian say: " As to closing the veins, it is proved by the authority of Jacob de Partibus that it retains outside and opens from within." Therefore, drugs were also classified according to these supposed actions on the organs and humors in the body.

Indian Pharmacopoeia

While the theoretical and basic sciences were yet undeveloped, as in Europe, the " Materia Medica " were numerous. Orta enumerates and discusses many drugs and simples used in India. But they cannot be all included in this brief article. The following is the list of the most important herbs and drugs very frequently referred to as popular and effective remedies or described on the authority of classical and medieval medical writers, supported, in some cases, by contemporary opinions or personal observations;

Aloes
Amber
Ammoma
Anacardium
Asafoetida
Bael
Bangue
Benjamy
Betel
Bezoar stone
Camphor
Carambola
Cassia Fistola
Cate
China Root
Cloves
Costo
Crisocola
Cubebs
Diamonds and other precious stones
Espodio
Esquinant
Fauful
Jacas
Galanga
Ginger
Leaf of India
Mango
Melon
Myrobalam
Negundo
Nimbo
Nutmeg
Pao de cobra
Pepper
Rhinoceros horn
Rose
Tamarind
Turbit
Turmeric
Zodoary.

We have only one brief reference to the method of preservation of drugs. Asafoetida was preserved in bullock hides, first anointed

with blood and then mixed with wheat flour. Similarly, descriptions of the manner in which the drugs were exhibited in the druggists' stores are infrequent. In druggists' shops, Manna of one kind was seen in flasks; another kind, a liquid, was in leather bottles; there was a third variety. There were also various forms in which medicines were dispensed: decoctions, pills, powder, conserves, lectuaries, losenges, etc. Most of the drugs were available in India, but some were imported, particularly some foreign herbs which were regarded as having greater potency than the indigenous varieties.

A Few Correct Observations

It was, however, possible for an intelligent observer to acquire some knowledge of the effect of some drugs on human beings. Orta gives many observations of which at least two may be extracted below:

(a) Bangue.

"I myself saw a Portuguese jester, who was for a long time with me in Balaguate, eat a slice or two of the electuary, and at night he was pleasantly intoxicated, his utterance not intelligible. Then, he became sad, began to shed tears, and was plunged in grief. In his case the effect was sadness and nausea. Those who saw or heard of it were provoked to laughter as if it was an ordinary drinking bout. Those of my servants who took it, unknown to me, said that it made them so as not to feel work, to be very happy, and to have a craving for food. I believe that it is so generally used and by such a number of people that there is no mystery about it. But I have not tried it, nor do I wish to do so. Many Portuguese have told me that they have taken it, and that they experienced the same symptoms, more especially the female partakers."

(b) Datura.

A servant girl enters and reports, "A negress of the house gave my mistress Datura to drink, took her keys and the jewels she had and ran away with another negro. Will you please succour my mistress?" Orta to Ruano: "You will be interested. Those who take this medicine lose their heads. They always laugh and are very liberal, for they let people take such of their jewels as they choose,

and only laugh or speak very little, and that not to the purpose. So that a robber has only to give this medicine in the food and the effect lasts twenty-four hours."

Some Inquiring Minds Attempted Pharmacological Experiments on Animals and Human Beings

Occasionally, some enterprising people attempted an experiment to test or prove the effect of drugs. Orta records one experiment with Rhinoceros horn. "Not only do they say that it is a good drink against poison, according to general belief but persons worthy of credit say that arsenic was given to two dogs, one receiving a double dose. To the one with the double dose, the scraping of the horn was given him to drink. This one lived; the other that had taken the smaller dose of arsenic died." Dimas Bosque supplies valuable information concerning Porcupine stone. "As for experience, I gave it to two persons who had been given poison. Being very ill, I gave them the water of this stone and they were soon much better. I give you my experience as the result of an experiment." Orta replied "God prolonging my life, I will try the same experiment many times for poisoning is very common in this land." Not only physicians but even kings occasionally tried an experiment and it is interesting to note here that condemned men were utilised for such experiments. Asked about a poison called Pisso, Orta proceeds to affirm as follows: "Nizamoxa wanting to try a liquor called Napella, he gave it to a prisoner condemned to death. It would seem that Pisso is more poisonous when given to drink."

Herbariums, Libraries etc.

Drugs were usually gathered in India from time immemorial from various forests and village gardens. In Europe, at the beginning of the 16th century, botanical gardens (Herbariums) were brought into existence and became immediately very popular at Pisa and Padua. Garcia da Orta seems to have initiated this movement in India. From the numerous references to different trees, it would seem that his garden at Goa was extensive and contained most of the trees and drugs commonly required at the time. Orta had another garden at Bombay. Another point of some academic interest is that whenever

Orta alludes to or describes a drug, he immediately gets a specimen of it from his garden or takes a walk into the garden, to demonstrate the chief physical features of the drug, so necessary for proper identification.

Very costly and rare drugs, diamonds, pearls, Bezoar stone, camphor, etc., highly valued for their miraculous effects, but far beyond the reach of the average people or physicians, were sought for, and treasured by the landed aristocracy and kings, who used their discretion in distributing small quantities of the required drug for the use of their domestic circle or courtiers.

Finally a word may be added regarding the facilities for reading or consulting famous medical texts and commentaries. Orta's library was one of the biggest and representative collections, containing not only medical classics but also chronicles of Europe and India and even of China. Drawings of simples of Dioscorides, and the commentary on Avicenna by Beluneuse, are mentioned. Nizamoxa, King of Deccan, also had a good library and showed to Orta, " Avicenna in Arabic," in support of some of his remarks.

Common Diseases of the Age and Lines of Treatment

Among the diseases of the period some require special mention either on account of the havoc caused by them or on account of the severity of the symptoms. Ruano clearly mentions that the worst diseases of the country were cholera and dysentery. One full chapter is devoted to the symptoms and treatment of cholera by different types of practitioners. It was more acute in India than in Spain and generally fatal in 24 hours. Orta knew cases that died in 10 hours and the " longest endurance " was 4 days. The symptoms described by Orta are as follows: " The pulse is very low, and can scarcely be felt. Very cold, with some sweat, also cold. Complains of great heat, and a burning thirst. The eyes much sunken. Vomits much, but so weak that he is unable to discharge anything. No sleep. Cramp in the legs." The cause of the disease is next stated. " Those who eat most, and those who consume most food. I knew a young priest here who died of eating cucumbers. Also those who have much intercourse with women. The disease is most prevalent in June and July, which is the winter in this country. As it is brought

on by over-eating, the Indians call it Morxi, which means, according to them, a disease caused by much eating." The treatment of the disease varied with the physicians attending on the case, whether it was a native physician or a Portuguese physician. Here is the method of the native physicians. " They give the patients rice water to drink, with pepper and cummin seed, which they call canje. They cauterise the feet in the way I ordered to be done to that gentleman. They also throw long pepper into the eyes to try its strength. For the cramp, they fasten up the head, arms, and legs with very strong bands down to the knees, and from the knees to the feet. They give him their betel to eat. All these things are not wanting in reason, though they are done roughly." On the other hand, the Portuguese used slightly different treatment. " We give them partridges and the best chickens to eat, or most of them; and we also give them wine with cinnamon. Administering these things to eat, I do not usually give much food, but rely upon exterior applications, such as anointing the stomach with warm oil of gum mastich and spikenard. I work with much care to clean the stomach with lavatory medicines only and with clysters. The treatment is varied according to the nature of the patient and the course which the disease may take."

Dysentery which Ruano noted as common in the Goa Hospital as well as among Orta's patients was a dangerous malady. Orta himself notes that when dysentery becomes old, it is very difficult to cure and if there is a hot humor it is very dangerous. Dimas Bosque also remarks that one of the principal cures to effect in this country is that of dysentery. A certain herb of Malabar seems to have been very efficacious in curing dysentery, and its fame spread even to Portugal. The Portuguese were also using the same herb but the procedure varied in minor details. The Arabs cured the dysenteries with opium rectified with nutmeg. There are also interesting sidelights. Orta states that if the patients do not appreciate his gentle medicines, he delivered the patients over to Malabars to be given stronger medicines. Ruano adds that licentiate Alvero Fernandes told him that he had an attack of dysentery and that he took the herb of Malabar by Orta's advice in the way it is administered by the Malayalims and not in the Portuguese way. Dimas Bosque contributes a very interesting passage. He says that though there are

many medicines which cure dysentery, no medicine will take effect in some old and chronic cases. He then narrates what we may now call a medical discovery of a simple medicine which cures even chronic cases of dysentery. This is probably how the Bael came to be known to the European physicians. " When the Viceroy Dom Constantino was in Jafanapatam, owing to the continual labour of fighting and the heavy rains to which the soldiers were always exposed, a great many sickened with dysentery; and their cure always fell into my hands, as there was no other doctor in the fleet. All the medicine we brought with us had been expended in the island of Manar, on the illnesses of the royal ships where in forty days I cured over 300 men. Having nothing left with which to treat the sufferers from dysentery, whose sickness gave so much work to the army, I was forced to try experiments with these Marmelos, of which I heard from the natives. I cured many cases with them, ordering plasters to be made for the belly and stomach. I also ordered a marmalade to be made which did not taste bad, and had a pleasant acid flavour. I ordered the sick to eat it roasted, with sugar. During the time that the dysentery lasted I caused clysters of the boiled bark to be applied which had an effect not very different from the balaustias which we use. Thus with this drug called Marmelos cures were effected in the absence of other medicines."

Diarrhoea was also common in India in those days. Orta cured an Overseer (of King's revenue) suffering from a poisonous diarrhoea by administering a clyster. Faufel was also used in the treatment of this disease.

Fevers, choleric fevers, old fevers, returned fevers, tertian fevers, quartan ague are frequently mentioned. A prescription containing tamarind was much used by the doctors of this country who do not give sugar in burning fevers. Melons were considered very good for tertian fever. Old or " returned " fever was treated with Pao de Cobra (root of Cobra); one ounce in water given twice caused a vomit of bile. Bezoar stone was a popular remedy for the quartan ague. A sort of fig, (Banana?) was recommended as diet in fevers and the body was anointed with sandal.

There is an interesting passage on the native and Portuguese methods of treatment of fever. " All men who have fevers do not

eat for ten and sometimes fifteen days. At the end of that time they are given boiled water of mungo in which there is some little sustenance. Afterwards they give it to eat with the rind torn off and boiled with rice. They do not give wheaten bread until after many days." This is how Guzarathis and Deccanis use mungo in the treatment of fevers. The Portuguese method was different. When asked by Sultan Bahadur of Cambay how Orta would cure Dom Martin who was attacked by fever, the veteran Portuguese replies, " I should have to bleed the patient, to give him syrup made of lime juice, pomegranates, sugar and purge him with a little rhubarb and manna." The King expressed an opinion that the Portuguese did not know so much about fevers as the Guzaratis, that the former did not know so well as the latter how to cure fever " for the Guzaratis did not cure in any other way than to give nothing to eat." Orta's methods seem to have been better appreciated a few years later when he was in Cambay once again. " During the time I was there, all the Moors wanted to be cured by me " (of fever).

Other common diseases of the age can only be briefly reviewed. Syphilis had already made its appearance in India and was treated with Chinaroot and Cloves.[8] Leprosy was an ancient disease of India. The King of Cranganore who suffered from Leprosy was given by the native physicians, pulverised mercury to drink for a long time. Orta cured him by the Portuguese method. Smallpox was a scourge in the Middle Ages. Orta gives a passage where some fever with rash was diagnosed and treated by the Court Physicians of Nizamoxa as a case of smallpox. Pao de Cobra seems to have been used in the treatment. Measles was common and fatal; was treated with Bezoar stone, one grain every day to extract the poison. Plague, the " Captain of the men of death " in the Middle Ages and later, was counteracted by many famous remedies like Pills of Razis or the Bezoar stone, and also some household drugs like ginger, which were believed to be curative and even prophylactic agents.

Apart from these infectious and epidemic diseases, many other diseases are mentioned and treatments indicated. Bladder com-

[8] " The Earliest literature on Syphilis and its treatment in India," *Indian Journal of Venereal Diseases.* 1938.

plaints were very common and virulent and were relieved by Bezoar stone. Diseases of the kidney, affections of the liver, chest complaints, skin diseases like itch, boils, ringworm, diseases of gums and teeth, ophthalmia, nervous diseases of women, intestinal parasites are some of the groups of diseases known to the age. A few individual diseases also figure here and there—asthma, scrofula, rheumatism, melancholy, colic etc.

Poisoning was very common in India at the time and it seems to have been cultivated as an art essential to statecraft. The kings and princes who were living in eternal dread of poison employed many men and means to detect poisons or to neutralise the bad effects of foods or drugs. There were special utensils, counter-poisons, like Pao de Cobra, Bezoar stone, Porcupine stone, Teriaca, and some Specialists in the treatment of poisons.

The Three Chief Systems of Medicine in Vogue

1. Indigenous system: This developed in the land through centuries of traditional lore and empirical observation. The learned and the orthodox practitioners were guided by the ancient classics of Charaka, Sushruta and Vagbhata. The commoner and amateur dabblers in medicine picked up a few things here and there and experimented on credulous folk. These practitioners of the indigenous system were not only scattered all over India, urban or rural, but were also well established and respected in the capitals and courts of Muhammadan Kings and Portuguese Colonies. Orta refers to the Indian writers but does not mention any name. Ruano quotes a passage from Serapium, in which Xarch (Charaka) the Indian physician is cited as an authority. In one of the discussions, it is noted that Avicenna refers to the " Indian writers " and " Experimentators." Orta opines that some of the Gentio physicians are learned men, while Ruano comments that the physicians of India have a good deal of reason in what they do. Orta definitely says in one place that " Gentio physicians are men who cure according to experience and custom." " They walk along one street curing all out of one flask that they carry." " These doctors are also wrong in their classification of the medicines for they call pepper and cardamom cold and opium hot." " As for anatomy, they do not

know where the liver is nor the spleen nor anything else." But they seem to have been successful in relieving suffering. "I can tell you that they cure the dysentery well, can tell whether there is fever or not from the pulse and whether it is weak or strong and what is the humor that offends, whether it is blood or heat or phlegm or melancholy; and they give a good remedy for obstruction."

The Indian doctors did not know physic through Arabian books but they were receptive to new ideas and methods and quickly incorporated in their practice some of the methods of diagnosis and treatment employed by the newly arrived Portuguese. "They (Indians) were never accustomed to look at waters except by watching what we do and copying like apes. Whence it happens that when they see the Urine while they take it for good sign and when it is red and thick they look upon it as bad." "They say there is bleeding and they never bled before we were in the land; but they used cupping glasses sawing and leeches." "They did not distill water before we came." At the same time it must be noted here that the Portuguese physicians acknowledge that they learnt or borrowed or copied some things from Indians.

Practitioners and promoters of this system need to be described here. The foremost of these were the physicians. Sultan Bahadur, King of Cambay, had a Gentio physician in his court. There were many Gentio physicians in Goa, the Portuguese capital, then at the zenith of its glory. Orta states that he conversed with many Indian physicians. He refers to Malayalim and Canarcese doctors who were successfully treating cases of dysentery. There is only one reference to Indian surgeons. A few personal notes are available regarding individual physicians mentioned by name or otherwise. The most picturesque figure and the only one whose name and discourse have been handed down to posterity is Mulappa, whom Orta considers as the best of the Indian physicians he came across. Mulappa was treating a negress in Orta's estate.

Side by side with or working under instruction of the physician were the apothecaries, the druggists, "Indian Apothecaries" "druggists of Goa and Chaul." "Apothecaries of India gain more by practice than by the sale of drugs"—a statement as true today as in the 16th century. Then, there were *banias* who were trading in

drugs on a large scale in Goa and in Diu. A *bania* told Orta about the uses of Turbit. Another class of people who were vendors of medicine in Cambay are described as " Gaundis." They seem to have learnt a good method of drying turbit from experience, and they brought the dried stuff to the Portuguese druggists for sale.

Side by side with the Gentio physicians were the Moorish physicians under which term the Portuguese included all the Turkish, Arabian, Persian and Khorassan physicians, who flocked to Indian kingdoms in search of patronage. Orta refers to " Physicians of Persia and Turkey " maintained by Nizamoxa by giving them large rents. Learned Moorish physicians lived in Balagate and Deccan. Mention is made of " the followers of Avicenna, who cure kings in this country." Orta also talks of " Physicians of India, Turkey and Persia who come to live in this land, curing kings and princes." Moors, great physicians, attended Nizamoxa. Physicians and other learned men were called Mullas. These stated that works of Avicenna, Galen, etc. were written in the language of Syria. Orta speaks highly of these physicians. " The physicians of Persia, Arabia and Turkey . . . knew Avicenna thoroughly. They know Razis, Halirodeam, Mesue. They also have all the works of Hippocrates, Galen, Aristotle and Plato, though not so complete as from the Greek foundation head." Turkish and Arabian physicians invariably followed Avicenna.

Of the Moorish physicians, two figures stand out prominently. Mulla Ulcem, was a learned Arabian physician with whom Orta conversed when he was at Junar, curing the son of Nizamoxa. This Arabian told Orta that Zedoary was efficacious for 36 things. Orta also saw the physician applying the medicine to a knee from which a merchant was suffering. Orta also tells the reader that this Mulla hated betel.

One of the physicians of Nizamuluco was formerly a physician of Xatamaz (Shah Tamas) and had been a long time in Constantinople and Cairo, which cities were still centres of Islamic culture and medical training.

Orta gives many interesting details about the drugs and modes of treatment adopted by them. " These moors have not adopted the practice (mode of giving purgatives) without authority nor is their

custom without reason." Moors had many good prescriptions containing Aloes, Esquinanto, Diallaca. They use pearl as a medicine putting it into their cordials and cure melancholy with diamonds.

European medicine, Portuguese and Spanish medicine in particular, first limited to Portuguese settlements, or Portuguese or half caste peoples, gradually began to spread into the non-Portuguese population of Goa, Diu, Bassein, etc. and then to cities and camps of the Kings of the Hindusthan. The theory and practice of this system was based on the writings of Hippocrates, Dioscorides, Celsus and Galen, but was appreciably modified by the learned treatises of the Arab masters, Rhazes and Avicenna. The introduction of printing and the general awakening of interest in philosophy and science made the first half of the 16th century an age of great compilers, annotators and highly critical commentators, of the ancient and mediaeval medical texts. (A list of these authors is printed elsewhere.)

These physicians, had their own methods of treatment. But they did not hesitate to borrow or copy some good treatments from the Hindu neighbours. They believed the good things that the natives said about the stick, Pao de Cobra " and in time they gained some experience founded on reason, after having profited from this antidote also, having seen this effect with their own eyes." The Portuguese practised the Indian method of treating dysentery, as it was decidedly more efficacious. Orta suggests that some of the Portuguese doctors and druggists began to use methods in imitation of the Indians, to please some of the clients. By the order of Nizamoxa Orta cured Piris Sancho, using Tabaxir, an Indian specific. Orta also tried with great benefit to himself tamarinds infusion for the pains in his body. The Portuguese had faith not only in Indian drugs but also in Indian doctors as well. A very honourable gentleman of Spain had a great regard for a Malayalim who had saved his life in a difficult case of dysentery. The daughter of an old Portuguese noble was cured of a troublesome dysentery by a bark prescribed by a native doctor of Goa. Even Orta confides " When we find that our patients do not appreciate our gentle medicines we deliver them over to Malabars to be given stronger medicines." Orta also acknowledges that he learnt the names of illnesses and

medicines in Arabic from Nizamoxa and the physicians in his employment.

Many references occur to the Portuguese apothecaries and druggists. There was an apothecary at Goa, to whom Orta gave instructions regarding a prescription. He mentions at least three other druggists. One was a man relied upon by a virtuous Governor. Another druggist was a learned man and pointed out the mistake of the first druggist, in failing to distinguish between Agnocasto and Negundo. Yet another is alluded to, as one who " made drugs for the Viceroy."

Portuguese physicians were not many. Orta himself adds that he is in great demand as there were not many learned physicians in the country. Orta may be said to be Prince of Portuguese physicians. He was learned in all the lore of the ancients and took infinite pains to read almost all the recent and contemporary writers on medicine as well as on other topics. His curiosity and his thirst for knowledge were remarkable. He made enquiries of all sorts of persons he met, learned or otherwise, low or high. He had wide practice in all communities and classes. In addition to the Portuguese patients, among whom were many nobles and the Bishop of Malacca, Orta had the honour of treating many Kings, Princes and Nobles of India. King of Balagate and his sons, Orta cured many times. He treated Nizamoxa and his father as well as the King of Cranganore. Hamzam, brother of King of Balagate, Pires Sancho, a Portuguese favourite at the court of Nizamoxa, rich Moors in Guzarat may be mentioned among the important personalities of the age who had him as their medical attendant. For this popularity, two reasons are suggested by Orta himself. He was old and learned. Being a foreigner, he only aimed at cures while other local doctors attached to one party or other had other political or mercenary motives and interests, not infrequently tempting them to certain acts of treachery.

Dimas Bosque, the Licentiate, was a graduate of Salamanca and came to India as the medical adviser to the Viceroy, in 1558 A. D. He was a learned man, corrected some statements of Orta in the book and had many cures to his credit. Licentiate Fernandez was on the staff of the Goa Hospital and was himself a sufferer from dysentery. The chief physician of Ceylon was Leonardo Nunez. A

relative of Orta was a physician in Bacein. Ruano refers to physicians who returned to Spain but could not enlighten him on Indian drugs.

Kings and Princes Acquired Knowledge of Medicine

In addition to the druggists and the practitioners of these three system of medicine, there were other persons who knew some drugs and effected occasional cures. Even the king Nizamoxa was familiar with the Arabian masterpieces. He taught Orta the names of illnesses and learnt from Orta the same in Latin. He was able to quote freely from Avicenna and produced from his Library " The Canon " in Arabic to prove some of his statements. He had many rare and effective medicines brought from Turkey, Persia, Arabia, paying high prices for articles like Ammomum. He also had some famous prescriptions prepared under his care (Mitridato or Tiriaca). He gave some suggestions to Orta regarding methods of treatment. Sultan Bahadur of Cambay talked of the effects of Camphor to Orta. The King of Ceylon, an old man, ordered cakes to be made of " Pedra di cevar " for him to eat in order to preserve his youth. A king of Bisnagar (Vizianagar) quoted an old description of Asafoetida as " the food of Gods."

Jogees or Indian Mendicants and Folk Medicine

There were Jogees who knew numerous medicines and modes of treatment, some true and others false. Even ordinary people were familiar with household remedies. " Truly it (Negundo) seems to need no physician, for upon entering a house to cure some pain there is sure to be a person saying that Negundo should be used boiled or fried in oil." Nimbo was another herb frequently praised and used by the lay public. Orta also refers to a few strangers or foreigners who are associated with medicine, though they may not have been actually treating cases. He refers to Jews of Jerusalem, " sons of physicians or apothecaries " who were in India, and to an apothecary of the same place, Spanish in language and Jew on his father's side. He also alludes to " those who came from Java who are midwives (Daias) and work as Doctors."

A Memorable Scene—European Medicine Face to Face with Indian Medicine

It is not possible to give even a brief description of all the drugs, methods of administration or even all the modes of treatment, recorded in the book in a short article. The descriptions of Bezoar Stone, Pao de Cobra or the procedures chalked out for the taking of purgative pills, and the treatment of cases of cholera or dysentery may rightly be called classic descriptions but space does not permit of their being reproduced here. But the object of the paper will not be fully achieved without the following quotation which graphically describes an interesting case and a scene where doctors differ and age-long prejudices rose up as obstacles in the path of newer ideas during the first contact of the East with Western medicine. In this passage Orta relates how he cured Nizamoxa's son. " He had the wish to be cured in our way but the custom of the country is much against it and it had to be withdrawn, especially because the educated physicians at his court liked to gratify the natives and to oppose me. So that when I was present they cured in one way, and when I was absent in another. If it does not bore you I will relate what happened in curing the hereditary prince, then a man of the age of thirty, strong with a good constitution and appetite. He had learnt the Portuguese language from me. He asked me in Portuguese what would be the best cure. I said that he should be bled and then take some rhubarb with whey. He said he was content to be bled, because in the last few days he had been bleeding through the nose. Wishing to do it, I was hindered by a physician of his who was the lord of many lands. Though both the father and the son were my friends, they decided to do what the other physician ordered. For, they said, that he was much exhausted by women, the patient having told me the opposite and this was done owing to the envy of the doctors. At the end of fifteen days the same man fell ill of a fever, and my vote was that he should be bled. But the physicians and the father would not consent for the reason already given. They further said that what he had was small-pox, which is a very dangerous illness in that land. I said that he had not got the symptoms of small-pox, but that if he should have them, it was better to bleed him during the three first days in conformity with

the rule of Avicenne, and to give him some drink made of tamarinds. They replied that it was true that Avicenna said what I had repeated, but that the custom of their country was different, also that the Deccanis held tamarinds to be bad for small-pox, so that neither quotation nor reason would prevail with them, at which the father and still more, the son were grieved. Presently they began to give infusions of figs, fennel, and ferns and saffron to throw back the small-pox which had never been there. By this treatment he became very hot and a very slight rash came out on his sides, which were not small-pox. But they told me he had small-pox, and that the fever would now end. Fourteen days had now passed and the fever had not ceased, nor were there further signs of small-pox, but they would not bleed nor purge nor give him anything to eat except mungo and rice water. He was dying of hunger, and complained to me of this every day in Portuguese. I secretly advised his father that he should be bled, as it was better late than never, and be given a fat fowl to eat, for he was a great eater and drinker of our wine when he was well. This appeared good to the father, and still better to the son. So I bled him copiously twice, and gave him plenty to eat, without the knowledge of the physicians, but in the counsels of the king, until success was in sight. At the end of twenty days he was well, without fever or any rash, the physicians being content with this success, boasting of their method of treatment and asking for rewards. The father replied that for their treatment they deserved a roasting, and that if I had not been there his son and heir would be dead. After fourteen days I explained the treatment by which he had been cured, and when they heard it they put their fingers in their mouths saying 'Ala quibir,' which means 'great God'; but not for this were they ashamed or confused." The king and the son were naturally very grateful to the Portuguese physician.

And generations of physicians in India and all those interested in the history of Indian medicine should feel equally grateful to Garcia da Orta not only for his brave efforts for introducing newer and more rational methods of treatment into India, but also for preserving for posterity a record of the forces at work and the reaction among people when two civilizations and cultures were brought together in India in the middle of the 16th century.

THE HISTORY OF THE ENEMA WITH SOME NOTES ON RELATED PROCEDURES

(PART I)

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The fact that instruments of precision, with their ever-changing additions and improvements, represent important stages in the development of a speciality in medicine is further illustrated by the part played by the clyster during its long history through the ages. Like the stomach tube which, for centuries in its primitive form to the present day with its modern modifications, has exhibited such an important rôle in the advancement of gastroenterology, so too the introduction of the enema apparatus followed by its gradual development and with its various modifications similarly represents an important epoch in the history of this special branch of medicine.

The employment of some form of enema dates back to the earliest times and is in fact as old as medicine itself. Certain historic documents, according to Montague [1] and Russell,[2] indicate that the Egyptians, Greeks and Romans make use of this procedure as an important therapeutic measure. The enema has also been referred to in the earliest medical treaties. According to Cabanès and Witkowski [3] this procedure may have already been practiced during the dynasty of the Pharoahs of Egypt.[4] There is a well known legend that the Egyptians derived their conception of the use of the enema

[1] Montague, J. F., "History and Appraisal of the Enema," *Medical Record*, Vol. 139, 1934, p. 91.

[2] Russell, W. Kerr, *Colonic Irrigation*, Wm. Wood and Co., 1932, pp. 5-21.

[3] Cabanès et Witkowski, *Joyeux Propos d'Esculape*, Paris, p. 8.

[4] Brugsch, H., cf. Cabanès et Witkowski, *op. cit.*, p. 8, footnote 1.

from an observation of a procedure practiced by the ibis bird, a type of stork. It was maintained that the ibis commonly injects water into its bowel with its beak. However, it is now known that this bird in the process of dressing its feathers inserts its bill into water and applies pressure with it against certain oil glands situated in close proximity to the anus. A careful investigation as to the actual truth of this observation was made by Chabas [5] with the discovery that the confusion occurred due to a misinterpretation of a hiero-

Fig. 1.

Stork purging itself.

[After a 15th century woodcut]

glyphic inscription between the word ibis and King Thot both written precisely in the same manner. On this account the Greek historian attempted to link the procedure with this bird. It appears therefore that the inscription of "Thot" may be considered as the first definite evidence established of the use of the enema by man. It is interesting that Pliny,[6] while describing therapeutic measures which included the use of enemas practiced by the Egyptians, credited the

[5] Chabas, F., "La Médecine des Anciens Egyptiens," *Mélanges Egyptologiques*, Paris, 1862, Chapt. V, p. 66.

[6] Pliny, Naturalis Historia, VIII, 97. See also: Pliny's *The Historie of the World*, tr. by Philemon Holland, London, 1601, Book 29, Ch. I; *The Natural History of Pliny*, trans. by John Bostock and H. T. Riley, London, 1890-1900, Vol. II, p. 291.

ibis with the discovery of the enema. He remarks, " the bird which is called the ibis and which is a native of the same country of Egypt, has shown us some things of a similar nature. By means of its hooked beak, it laves the body through that part by which it is especially necessary for health that the residuous food should be discharged. Nor, indeed, are these the only inventions which have been borrowed from animals to prove of use to man."

Our knowledge concerning the use of the enema by the Egyptians is largely derived from the work of Herodotus.[7] Herodotus and Diodorus Siculus [8] traveled extensively in Egypt and gained a remarkably clear insight into the medical activities of this country during the later period of its history. They came in close contact with the embalmers of whom Diodorus states:

> These men called embalmers however, are considered worthy of the honor and consideration associating with the priests and even coming and going in the temples without hindrance as being undefiled.

The observations of Herodotus regarding the hygienic customs of this country are still classic and are of the greatest historical importance. This Greek historian in describing the method of embalming in Egypt narrates that in conducting this procedure among the poorest at death, the embalmers whose whole business this is have the special craft to conceal the body for seventy days embalmed in saltpetre. This is how they prepare the dead who have wished for the most costly fashion. The embalmers charge their syringes with cedar oil and then will fill the belly of the dead man making no cut nor removing the intestines, but injecting the drench through the anus and checking it from returning; they then embalm the body for the appointed day. On the last day they let the oil which they poured in pass out again. It has so great power that it brings away the inner parts and intestines all dissolved. The flesh is eaten away by the saltpetre. In the end nothing is left of the body but the skin and bone. It is quite possible that this procedure may be accepted as an indication of the Egyptian origin of the enema.

[7] Herodotus, Book II, Chaps. 86 and 87, trans. by A. D. Godley, New York and London, 1926, Vol. I, pp. 371, 373 [Loeb Classical Series].

[8] Diodorus of Sicily, Book I, Chap. 91, trans. by C. H. Oldfather, New York and London, 1933, Vol. I, p. 311 [Loeb Classical Series].

Herodotus also states " they purge themselves every month for three days in succession seeking by means of purgatives, emetics and clysters as well as by abstinence from food to preserve health as it is their belief that all disease is the result of the food consumed."

An important medical papyrus acquired by George Ebers in 1872 contained directions for the use of enemata of various forms and indicates that this method of therapy was practiced as early as 1550 B. C.[9] Enemata were utilized both in Rome and Greece. Hippocrates,[10] the father of Greek medicine, frequently refers to the use of the clyster in his works and also to suppositories containing various ingredients. He advises the employment of suppositories consisting mainly of honey enveloped in oxgall. He states, " if the previous food which the patient has recently eaten should not have gone down give an enema if the patient be strong and in the prime of life, but if he be weak a suppository should be administered should the bowels be not well moved on their own accord." Great credit is due Celsus [11] for a very clear description of the use of the enema. He remarks, " the patient should have his diet regulated on the previous day so as to be properly prepared for the enema. For medicine is generally offensive to the stomach and if the body be violently purged or clystered too often it debilitates the patient. Therefore in sickness medicine ought never be administered with that view unless the disease be without fever. But generally the bowels are preferably opened with injections. This remedy should neither be too often repeated nor entirely omitted but used once or at most twice if there be heaviness of the head or dimness of the eyes, if there be disease of the greater intestines which the Greek call the colon, if there be a bilious accumulation in the stomach, if the bowels do not act spontaneously, if there be scybala retained in the rectum, or if the patient feels a stercoracious factor arising from his breath whilst his bowels are constipated, or if the excre-

[9] Montague, J. F., *loc. cit.*

[10] Hippocrates, trans. by W. H. S. Jones, New York and London, 1923, Vol. II, pp. 60, 79 [Loeb Classical Series].—*The Genuine Works of Hippocrates*, by Francis Adams, London, 1849, Vol. I, pp. 85, 93, 103, 289, 314, 332 [The Sydenham Society].

[11] Celsus, Aurelius Cornelius, *On Medicine*, in eight books, trans. from Targa's edition . . . by Alexander Lee, London, 1831, Vol. I, Ch. XII, pp. 108, 109, 110.

ments be foul. If an enema of a varied type is not required pure water will suffice. However, if a more active one is needed a decoction of Greek fennel, of barley or of mallow may be utilized. An astringent enema is prepared from a decoction of verveine. If a stimulating enema is indicated sea water or ordinary water in which salt has been dissolved may be employed. The effect may be more beneficial if the water has been boiled. The enema may be made still more active by the addition of oil or saltpetre or even honey. The more acid it is made the better the effect. However, retention is then made more difficult. The fluid injected should not be too cold nor too hot; that is, it should be of a medium temperature. Following the administration of the enema, the patient should remain in bed and retain the injected fluid as long as possible." Celsus also calls attention to the use of nutrient enemas which is possibly the first indication of their use in the literature, though this credit has been accorded by some to Avenzoar [12] of Cordova who was known for his faith in the power of emeralds and bezoars in the healing of certain diseases though he was nevertheless recognized to possess considerable clinical insight. He recommended lavage of the lower bowel previous to the administration of the nutrient enema. As he flourished centuries later (1126 to 1162 A. D.) than Celsus this credit should hardly be accorded him.

Aetius,[13] a Greek physician of the sixth century (the royal medical adviser to Justinian I), preferred enemas of pure water, while Galen [14] who lived in the second century of our era recommended enemas of various forms including water mixed with oil and honey. In the treatment of the ordinary tertian fever he advises the evacuation of the bowels by means of emollient clysters. Asclepiades,[15] who

[12] Cf. Robinson, Victor, *Story of Medicine*, New York, 1931, p. 170.

[13] Brock, Arthur John, *Greek Medicine: being extracts illustrative of medical writers from Hippocrates to Galen*, London and Toronto, New York, 1929, Chap. XII, p. 256.—Also Plouquet, Wilhelm Gottfried, *Literatura Medica Digesta, Tübingen*, 1808-1809, Vol. I, p. 300, which refers to Aetius' *Tetrab.* III, Serm. I, c. 49.

[14] *Oeuvres Anatomiques, Physiologiques et Médicales de Galien*, tr. par Charles Daremberg, Paris, New York, 1854-56, Vol. II, Chapt. XI, pp. 726, 731, 740, 752.—Galen, *De clysteribus et colica liber*, Leyden, 1591.

[15] Caelius Aurelianus, *De Morbis Acutis et Chronicis Libri VIII* (edition of Jo. Conradus Amman), Amsterdam, 1709, pp. 171, 174.

was born about 124 B. C. and to whom Allbutt [16] points as a pioneer in the first effective invasion of Rome by Greek medicine and reminds us in many ways of Boerhaave, has frequently referred to the use of the enema in his writings. He preferred this procedure for the treatment of constipation to the use of purgatives and likewise considered it as a valuable remedy especially for the expulsion of worms. He regarded this procedure more particularly as indispensable for the relief of fevers. On the other hand, he prescribed enemas so irritating as to cause intense shock and febrile reactions. He also called attention to the benefit of nutrient enemas. Oribasius,[17] physician to Julian the Apostate, in his compilation from various authorities, presented a rather elaborate and complete chapter of fifty pages on the use of enemas. He divided the ingredients to be injected as soothing or acrid. The soothing ones consist of warm water or a mixture of oil and water, milk and other media. The acrid forms contain sea water, salt water and other ingredients. The indications for the use of soothing or acrid types of enemas are stated and attention is directed to the indications and use of nutritive enemas. Oribasius likewise directs attention to the position of the patient to be maintained during the administration of the enema and the quantity of fluid to be utilized. He also points out the composition of various types of enemas for the treatment of special diseases, i. e., dysentery, disturbances of the rectum, cholera, ileus, affections of the colon, kidneys and bladder.

Rufus of Ephesus,[18] who lived in the reign of Trajan, the remains of whose work has been compiled by Daremberg, also recommended clysters of various kinds for numerous conditions such as suppuration, inflammation and calculi in the kidneys, gout, jaundice and other affections.

Enemas were generally employed in Rome as well as in Athens. When Roman women were distressed with indigestion, they either entered the Vomitorium in order to obtain relief or were treated by

[16] Allbutt, T. Clifford, *Greek Medicine in Rome*, London, 1921, pp. 177 and 178.

[17] Oribasius, Collection Médicale, Livre VIII, Ch. 24, Des Injections.—Tiré de Rufus, in: *Oeuvres d'Oribase*, tr. par Bussemaker et Daremberg, Paris, 1854, T. II, p. 204.

[18] *Oeuvres de Rufus d'Éphèse*, par Ch. Daremberg et Ch. Émile Ruelle, Paris, 1879, pp. 12 and 492.

means of enemata administered by means of a leather flask to which two hollow reeds were attached, the one to allow the fluid to flow into the bowel and the other to permit the escape of gas. It is of interest to a note that a remnant of a syringe was discovered in the ruins of Herculaneum. It is doubtful however whether the instrument of which it was a part was utilized for administering enemas.

The usual apparatus utilized by the Romans was described by Avicenna [19] (980-1036), the renowned Arabian physician. He states that, " the enema is an excellent agent for getting rid of the superfluities of the intestinal tract as well as for allaying pains over the kidneys and bladder and for relieving inflammatory conditions of these organs and also for relieving pain and for drawing superfluities from the vital organs of the upper parts of the body." He also describes the various types of enemata, the material for their use and the time at which the treatment should be given. He also describes the use of the oil enema which is recommended as the type of treatment to be followed in elderly individuals.

While Avicenna was personally definitely convinced of the efficacy of this method of treatment, yet it is said that he himself had suffered with an epileptic seizure following the administration of eight enemas containing pepper. He did not, however, recommend this procedure for general use.

The clyster has not always been regarded favorably among all peoples. It was truly an actual object of horror among Mussulmen who, according to Bertherand,[20] would prefer death to the administration of even a mild injection into the bowel. Colson [20a] states in his thesis in referring to Arabian Medicine, that the Imnen Ahmed promulgated a disapproving edict as to the use of the enema unless it was found absolutely imperative; on the other hand, other reputable authorities such as Djarab, Mondjabed Hacan Toouns, Amir and many others declare that the clyster is not at all to be condemned

[19] Avicenna, On Enemas (Advantage and Use), in: O. Cameron Gruner, *A Treatise on the Canon of Medicine of Avicenna Incorporating a Translation of the First Book*, London, 1930, pp. 449, 500, 859.

[20] Bertherand, E. L., *Médecine et Hygiène des Arabes. Études sur l'Exercice de la Médecine et de la Chirurgie chez les Musulmans de l'Algérie*, etc., Paris, 1855, p. 136.

[20a] Cf. footnote 47.

as reprehensible. According to Khallal, the second Caliph Omar considered the clyster as something which could be tolerated. "On this matter, I have interrogated Mohammed, son of Ali," says Djaber "concerning the use of the enema." "There is nothing ignoble, he responded to me, concerning its employment; it is a method of treatment quite like any other." Abou Behr El-Mourouji addressing the father of Abd-Allah's regarding the advantages of clysters put this question to him. To take an enema does one break a fast or not? Apparently there seems to have been no answer given to this question.

The Hindoos, according to Sprengel,[21] likewise had a great aversion to this form of treatment viewing it as an artificial measure of performing a natural function. However, many others have favored its employment. It is an interesting observation that the enema is not referred to in the early Jewish texts either in the Bible or in the Talmud. Preuss [22] states that in spite of the close commercial alliance between the early Egyptians and Jews in Palestine, the clyster while well known in Egypt is not mentioned in the Talmud (fourth and fifth centuries A. D.).

On the other hand, it has been a well recognized procedure among the primitive races of Africa. In Nigeria (Central Africa), according to Huot,[23] it is considered a favorite mode of treatment especially for infants. The procedure consists in the forcible injection of water held in the mouth of the mother through a bamboo tube and applied into the rectum of the infant.

On the Ivory Coast the inhabitants administer enemas through a calabash filled with water; the narrow neck is inserted into the rectum and by means of forcible oral inflation through another opening the attendant forces the contents into the bowel. In other instances, the individual reclines over the knees of the attendant and the enema is thus administered in a similar manner. When the patient administers the enema to himself he first produces a negative pressure in the calabash as the result of suction, places his finger at the orifice, bends forward, his head as low as possible, inserts the

[21] Sprengel, Kurt, *Histoire de la Médecine, depuis son origine jusqu'au dix-neuvième siècle*, Tr. par A. J. L. Jourdan, T. I, Paris, 1815, p. 83.

[22] Preuss, Julius, *Biblisch-talmudische Medizin*, second edition, Berlin, 1921, p. 4.

[23] Huot, M., "Les Peuples de l'Oubanqui et de Bahr-el-Ghazaczal Territoire d'Oubanqui," *Revue Scientifique*, Quatrième série, T. 17, Paris, 1902, p. 303.

neck of the flask into the anus, removes the finger and allows the contents to penetrate into the rectum by means of atmospheric pressure. Following the administration of the entire solution into the bowel, the patient arises, then stoops and defecation follows almost immediately.

Fig. 2.

Calabash for the administration of enemas.

In Africa along the upper Congo River, a calabash was frequently employed for this purpose, a hollow cane being attached to the lower open neck and held by means of resin. The fluid used for the enema was allowed to enter the calabash through another higher orifice. The tip of the hollow cane was inserted into the anus and the fluid allowed to flow into the bowel, the patient being placed in such a posture that advantage could be taken of gravity.

In India and among certain African tribes a cow horn, hollowed through its entire length, was utilized for this purpose. The tip being inserted into the rectum, the water was forcibly introduced by the activity of a flowing stream into the larger orifice and entered the bowel as the result of gravity.

In his "Mystery and Art of the Apothecary" C. J. S. Thompson [24] states that R. Campbell Thompson had pointed out in his transcriptions of Assyrian Medical Texts published in 1923 that the enema was utilized by the Babylonians as early as 600 B. C. Its origin appears to have been based upon the belief that in the process of administering the injection, the demon of disease was evicted from the body. The remedy utilized for the enema was not only injected but given orally as well and the entire body sprinkled with the same material. The text of Thompson reads as follows: "Mix rock salt and ammonia with unmixed wine. Let him take it without food through his mouth as well as by his anus and sprinkle him with it and he will recover."

According to Garrison [25] the surgical arm of treatment in India reached the highest development attained in antiquity. Sushruta who lived in the fifth century was a remarkable Hindu surgeon and formulated special directions for performing surgical procedures. The Sushruta as Jee [26] points out described 121 various surgical instruments including syringes, bougies and a rectal speculum. According to Thompson,[24] the enema syringe of the early Hindu physicians was prepared from the scrotum of a deer, goat or ox with a tube of bamboo ivory or horn. They utilized medicated oils or water as injection fluids.

Chang Chung Ching, who flourished in the so-called historical or golden period of ancient China (1121 B. C. to 960 A. D.) and who Wong and Lien-Teh [27] state was known as the Chinese Hippocrates

[24] Thompson, C. J. S., *The Mystery and Art of the Apothecary*, London, 1929, pp. 6, 8, 10, 19, 240 (contains reference to Helvetius); Helvetius, see also M. Maubec, *Traité de la Dyssenterie*, Paris, 1712, p. 285.

[25] Garrison, Fielding H., *Introduction to the History of Medicine*, Philadelphia, 1924, p. 64.

[26] Jee, Sir B. Sinh, *A Short History of Aryan Medical Science*, London, 1896, pp. 176-181, Plates 1-10.

[27] Wong, K. Chimin and Lien-Teh, Wu, *History of Chinese Medicine*, Tientsin, 1932, p. 34.

and the greatest physician that China has ever produced, was the first to employ enemas. He remarks " Do not give drastic purgatives for the constipation of typhoid for the internal secretion has dried

Fig. 3.

Early Hindu Rectal Instruments

[From Sir B. Sinh Jee, *A Short History of Aryan Medical Science*, London, Macmillan and Co., 1896, p. 182.]

up. An enema of pig's bile should be administered." The directions according to Wong and Lien-Teh for preparing the enema is as follows. " Secure a large pig's bile and mix with a small quantity of vinegar. Insert a bamboo tube three or four inches long into the

rectum and inject the mixture." Hume [28] also directs attention to this eminent Chinese physician Chang Chung Ching and his preference for the use of the enema in place of cathartics.

Both Maitre Henri de Mondeville, the surgeon of Philipp the King of France, and Guy de Chauliac, the most distinguished authority on Surgery in the fourteenth century, employed the clyster in their practice according to Nicaise.[29] The term syringe was applied by Guy to designate urethral catheter. He constantly made his rounds of patients with a clyster kit and considered it a most important apparatus for the treatment of an overfull bowel.

John Arderne [30] who lived about the same time (1307-1390) was an English surgeon, who likewise favored the use of the enema. His treatise on fistula in ano, hemorrhoids and clysters give evidence to this fact and provided information of the extensive employment of the procedure in England by the women of that day. He refers to the use of hiera picra (combination of aloes with other substances), utilized in 1370 in clysters, but which left the patient more constipated afterward. Arderne published an essay on clysters and employed an instrument of his own design.

The development of the clyster from the primitive tube to our present form represents a series of historical events of unusual interest. If one proceeds from the bamboo tube of certain African tribes through which water is injected orally by the mother into the rectum of the infant and from the specially prepared bag of the inhabitants of the Ivory Coast and the leather bottle with its hollow reed attachment described by Avicenna to our present type of apparatus, one finds a fairly similar principle carried out throughout the ages.

As far as we are aware, priority as to the discovery of the clyster cannot be accorded to any single individual. This honor, however,

[28] Hume, E. H., "Medicine in China, Old and New," *Annals of Medical History*, New Series, 1930, Vol. II, No. 3, p. 275.

[29] Nicaise, E., *Chirurgie de Maitre Henri de Mondeville (1306)*, Paris, 1893, pp. 426 and 720.—Nicaise, E., *La Grande Chirurgie de Guy de Chauliac* (1363), Paris, 1890, p. 589, with 3 figures.

[30] Arderne, John, *Treatises of fistula in ano; haemorrhoids and clysters.* Edited with introduction, notes, etc. by D'Arcy Power, London, 1910 [Early English Text Society, Original Series 139].

has been accredited to Marco Gatinaria,[31] a native of Pavia, professor in the University and a compatriot of Christopher Columbus, who described the enema apparatus in his book. It is claimed that he devoted many years to the completion of this treatise which in the course of the 16th century had four editions. Gatinaria died on February 14, 1496. However, the priority of the claim has been disputed. According to Defosses and Martinet,[32] it is known that he simply described an improvement in the apparatus proposed by Avicenna; this was recognized as a double current syringe, one tube serving for the passage of air and the other for water. However, Malgaigne [33] attempts to prove that it bears little resemblance whatsoever to that of Avicenna and attributes the invention of the syringe to Gatinaria. All in all the conclusion gained as a result of a careful study of the literature from all sources is that the discovery of the enema syringe occurred well in advance of the 15th century. It is impossible to arrive at any definite conclusion regarding priority. It is known, however, that almost throughout the Middle Ages enemata were administered and were given either by means of the enema bag or through the so-called syringe of Albucasis. Both procedures are described by Nicaise [34] in an article on the pharmacy and materia medica of the 14th century. He states that Albucasis in the 10th century was the first to describe the syringe, although this credit has been given to both Avicenna and Gatinaria. Albucasis (1013-1106) [35] of Cordova published a special treatise on surgery and was the inventor of a variety of surgical instruments. He invented an ear syringe which he thus describes. "You may also introduce into the clyster tube a specially constructed piston, the end of which is armed with cotton. Then fill the tube with oil or other fluid, introduce into one end of the piston armed with cotton and push it

[31] Gatinaria, Marco, *De curis aegritudinum particularium noni Almansoris*, etc., Lyon, 1532.

[32] Defosses, P. et Martinet, A., "Le Lavement," *La Presse Médicale*, 1903, Vol. I, p. 309.

[33] Malgaigne, J.-F., *Oeuvres Complètes d'Ambroise Paré*, Tome I, Paris, 1840, Introduction pp. xcvii and xcix.

[34] Nicaise, E., "La Pharmacie et la Matière médicale au XIV[e] Siècle," *Revue Scientifique, Histoire des Sciences*, Tome 49, 29 Année, Paris, 1892, p. 429. See also footnote 29 and Cabanès et Witkowski, *loc. cit.*, p. 18.

[35] Albucasis, *De Chirurgia*, ed. J. Channing, Vol. II, Chapt. 83, Oxford, 1778.

onward until the liquid enters the ear." The first illustration of the syringe of Albucasis is to be found in the work of Hieronime Brunschwig "Das ist das Buch der Cirurgia." J. Gruninger, Strasbourg, 1497. (Pl. XIX.)

As an illustration of how at so early a period as the 14th century the enema was taken advantage of as means of profiteering, Forestié [86] tells the story of two brothers, Bonis by name, living in the 14th century. The youngest was an apothecary who was not content with the sale of drugs or dispensing of prescriptions alone, but in addition prescribed himself sometimes and thus increased his income greatly. He also administered simple and medicated enemas at excessive rates.

Before the invention of the syringe enemas were administered by means of a vessel usually prepared from animal skin or a pig's bladder to which a tube (reed or hollow stem) was attached, the soft container being emptied as the result of pressure with both hands. Notwithstanding the fact that the syringe had been in general use during the fifteenth century recourse to the older method was frequently preferred by many individuals.

That the enema was well recognized at this period is indicated by a passage in Shakespeare [87] (1564-1616) when in Othello, Iago says, "Yet again your fingers to your lips? Would they were clyster pipes for your sake." Montaigne [88] (1533-1592), the essayist and medical philosopher, was likewise familiar with the clyster. He was affected for years with maladies which physicians seemed unable to combat. In describing his symptoms and treatment in detail he states that he suffered greatly from gaseous distention. This so distressed him that he took a clyster of oil of chamomile and anise seed which was administered with great skill by his landlord and he felt infinitely better the following day. Gerarde [89] in his Herball in 1633 in referring to the virtues of mallow states:

[86] Forestié, Edouard, *Apothicaires, médecins et chirurgiens montalbanais du XIV^e Siècle*, Montauban, 1887; see also Cabanès et Witkowski, *loc. cit.*, p. 20.

[87] Shakespeare, William, *Othello*, Act 2, Scene 1, 180.

[88] Taylor, James S., *Montaigne and Medicine; Being the Essayist's Comments on Contemporary Physic and Physicians*, London, 1922, pp. 221 and 222.

[89] Gerarde, John, *The Herball or Generall Histoire of Plantes*, London, 1633, p. 932.

The decoction used in clysters is good against the roughness and fretting of the guts, bladder and fundement.

Although Gatinaria may not have been actually the inventor of the syringe, yet full credit is due him for popularizing this instrument and simplifying its technic which marked definite progress in the application of the enema.

A modification of this instrument is pictured in Bramellas Surgical Atlas published in 1780 to 1832. Yet further improvement seemed necessary since with the apparatus at hand it was impossible for the patient to apply this treatment himself and the aid of an attendant was required. Credit is due Regnier de Graaf [40] who fully realized the necessity of further overcoming certain difficulties in this treatment. He recognized the value of the enema and its importance as a medical procedure and his attention was directed to the difficulties in its application by the patient himself. On this account he recommended an improvement in the treatment simplifying the apparatus so that it could be applied without difficulty or danger of injury.

Regnier de Graaf was born in Schoonhaven, Holland, in 1641 and died in 1673 at the early age of 32 years. He was the son of a Dutch architect and engineer and studied medicine at Utrecht at the age of 19. Later he continued his studies at Leyden specializing particularly in the direction of research but nevertheless did not neglect his clinical studies at the hospital. He was especially attracted to two professors of anatomy at the institution during this period, Van Horne and De La Boe (better known as Sylvius). He completed his medical studies in Paris but he received his degree at the University of Angers where he spent some months, returning to Delft in Holland to assume the practice of medicine. De Graaf was a physician of prominence whose investigations still remain as notable contributions to medicine. He was the first to study the functions of the pancreas [41] and its secretion in animals in advance of the work of

[40] de Graaf, Regnier, *De virorum organis generationi inservientibus, de clysteribus et de usu siphonis in anatomia*, Leyden and Rotterdam, 1668. French translation: *L'Instrument de Molière*, Paris, 1878; the translation was published anonymously, said to have been done by the surgeon Cusco.

[41] de Graaf, Regnier, *Traitté de la nature et de l'usage du suc pancréatique, où plusieurs maladies sont expliquées, principalement les fièvres intermittentes*, Paris, 1666.

Fig. 4.

Title page of de Graaf's book.

Claude Bernard describing the method of collecting the secretion by means of a pancreatic fistula. He published a description of the testicle and in this work is found his essay on the use of enemas. In 1672 his classic volume on the ovary appeared which represents the first description of the structure of the Graafian follicles.[42]

In reference to the enema de Graaf states in his work: "It has been a common occurrence in this country to meet with patients suffering intense and intolerable pains in the abdomen and other parts of the body, which undoubtedly might have been both relieved quickly and without difficulty, but these patients nevertheless most obstinately refuse the exposure necessary to receive this treatment at the hands of the apothecary. On this account we have searched with care to discover as to whether there was not some instrument at least with which an enema could be taken one's self without danger and without offending one's sense of modesty."

"Our search in this respect proved fruitless for none of the methods hitherto utilized and known to us all consisting of a syringe to which a curved cannula of ivory, wood or thin (pewter) was attached which was intended to be inserted into the bowel was free of disadvantages or even danger."

It happened at this period (1668) that the type of clyster with the bent tube as described by de Graaf and ordinarily utilized by the apothecary was difficult for the patient to both insert and inject the contents without assistance into the bowel.

De Graaf recognized this fact that the enema fluid to be injected could not be forced through the syringe without unduly moving this instrument at the same time. This displacement necessarily jarred the tube in the rectum resulting often in trauma to the tissues or it allowed the enema to escape and to be expelled at the side of the cannula. Such accidents happened quite frequently since the patient was not able to use both hands in operating the syringe.

The apparatus of Fabry of Hilden [43] was also found objectionable by de Graaf. Hilden, who is now regarded as the father of German

[42] de Graaf, Regnier, *De mulierum organis generationi inservientibus tractatus novus*, etc., Leyden, 1672.

[43] Hildanus, Guilhelmus Fabricius, *Opera quae extant omnia*, etc., Frankfort, 1682, p. 56, observatio 78.

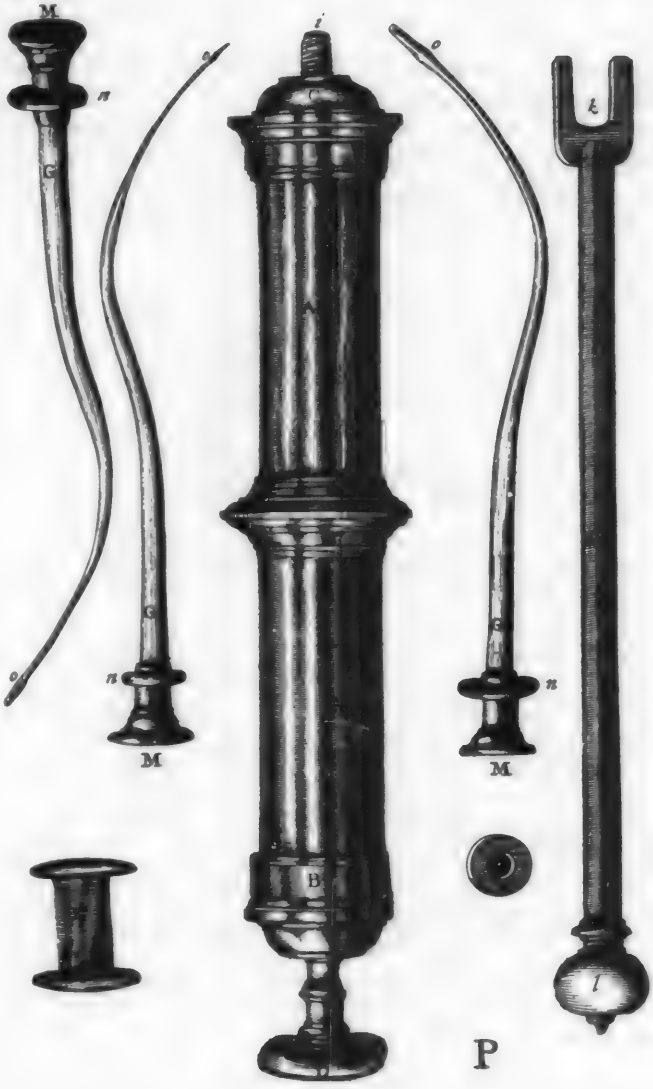


Fig. 5.

Injection syringe and accessories.

[From R. de Graaf, *De virorum organis generationi inservientibus, de clysteribus et de usu siphonis in anatomia*, Leyden and Rotterdam, 1668, opp. p. 234.]

Surgery, employed the ancient type bladder to which a hollow stem was attached forming the enema apparatus. The bladder was emptied by manual pressure. With such an instrument says de Graaf " the enema cannot be completely expelled from the bladder and if too great pressure be produced the bladder may become detached from

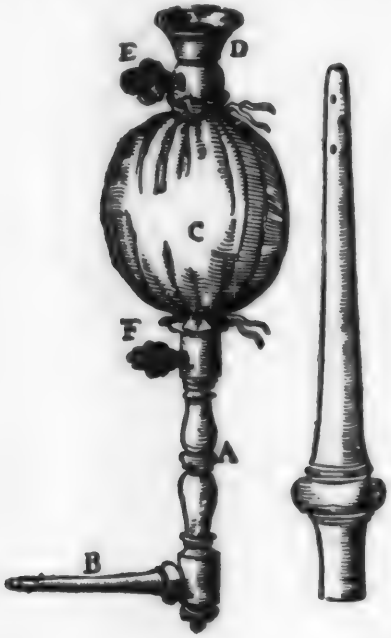


Fig. 6.

The clyster apparatus of Fabricius Hildanus.

the tube or it may rupture. Furthermore, this procedure requires the use of both hands, one to compress the bladder and the other to steady the tube while in position."

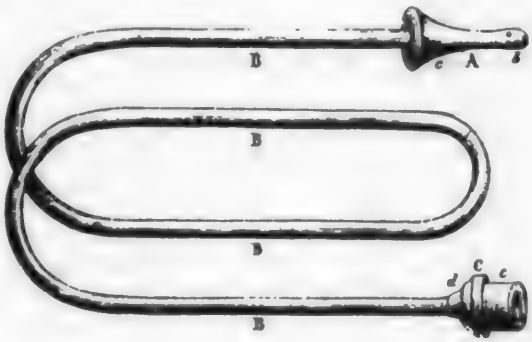
Nor was the apparatus of Ambroise Paré [44] less objectionable. Paré devised his own apparatus to which the following explanation is attached: " the figure of a clyster pipe and syringe by benefit

[44] Paré, Ambroise, *The workes of that famous chirurgion Ambrose Parey*, trans. by Th. Johnson, London, 1634, Lib. 26, Chap. XXII, Of Glysters, pp. 1050 and 1051.

XXXIII

Explication de la figure représentant l'instrument que nous avons inventé.

A. Canule destinée à être introduite dans l'intestin. Elle est en bois ; elle n'est pas semblable à celle des seringues ordinaires, qui sont, le plus



souvent, trop longues : ce qui est non-seulement inutile, mais encore dangereux. Il suffit que, dans sa partie supérieure, B, où elle est percée de petits trous, elle dépasse le muscle sphincter. La canule, telle qu'elle est reproduite dans la figure,

Fig. 7.

Intermediary tube used by de Graaf.

[From Regnier de Graaf, *L'Instrument de Molière, traduction du Traité de Clysteribus*, Paris, 1878, p. 110.]

whereof a man may give himself a clyster." He presents definite instructions as to the quantity to be injected varying according to age and disease. He advises various type of enemas for a variety of affections and explains as to whether these should be given hot or cold. Clysters accordingly should be utilized to evacuate colicky matter, relieve melancholy, to administer anodynes and astringents and to maintain nutrition.

De Graaf,[45] after many difficulties in selecting material for the proper type of tube, succeeded in producing an apparatus consisting of an intermediary tube, flexible and impermeable, through which liquids could be injected with great ease without pain and without danger not only into the bowel but by a simple change in the cannula also into the uterus as well as other parts of the body. The entire originality of this invention and its actual advance lies in the intermediate slender flexible tube of sufficient length to be easily manipulated (5-6 feet) which is attached between the syringe at one extremity and the rectal tip at the other. At first the flexible tube was prepared from the intestine of a fowl. This, however, proved unsatisfactory. After many unsuccessful attempts he finally prepared a tube from a strip of thin leather cut to fashion rolled in a cylindrical form, sewed firmly together and finally waxed to avoid leakage. The entire tube was finally encased in a covering of black silk. De Graaf describes the tube " as not being unlike the pipes used by the English for introducing tobacco fumes into the bowel." " A conical wooden shaped cannula is attached to one end of the flexible tube. It contains lateral openings and is so constructed as to fit perfectly into the anal orifice so as to prevent the leakage of any injected fluid. At the other end of the tube a wooden funnel is attached into which the enema syringe is made to fit snugly. In employing this instrument, the syringe is filled and sufficient fluid forced out through the flexible tube in order to fill it as far as possible and thus avoid the introduction of air into the bowel. The anal tip is thoroughly greased with candle tallow and inserted into the anal orifice. As the patient retains the rectal tip in position with one hand (the syringe meantime resting on his chest), by compressing the piston the syringe is emptied with the other. One of the advantages of this apparatus is that it can be applied by the patient himself due to the flexibility of the tube."

[45] de Graaf, French translation (*loc. cit.*), footnote 40, pp. 49-122.

ſter to himſelfe, by putting up the pipe into the fundament, lifting the buttockes a little up. The pipe is marked with this Letter *A*. The body of the Syrenge, whereinto the Glyſter muſt be put, with this Letter *B*.

The figure of a Glyſter pipe and Syrenge, by benefit whereof a man may give himſelfe a Glyſter.

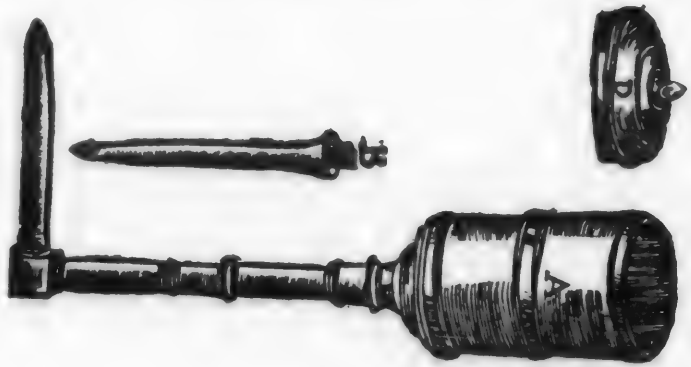


Fig. 8.

[From *The workes of that Famous chirurgion Ambrose Parey*, trans. by Th. Johnson, London, 1634, p. 1053.]

"If however the patient wishes to take an enema in bed under cover and without exposure this can easily be accomplished owing to the flexibility of the tube. After inserting the rectal tip while lying in a convenient posture either on his back or side, the patient signals the assistant manipulating the syringe outside the bed when to begin injecting the fluid. This treatment is accomplished with such ease that the patient after once having taken a clyster will no longer raise objection to its use. Furthermore, those who were unwilling formerly to take an injection under an circumstances are now the first to demand this form of treatment instead of the use of purgatives."

The syringe utilized by de Graaf himself was manufactured of copper or silver. The flexible tube was screwed to the syringe and fastened by a key and the joint was prevented from leakage by means of a leather washer. De Graaf was not only interested in the use of this instrument for the administration of enemas but equally for injecting the blood vessels [46] in the cadaver in order to facilitate the tracing of the arteries and veins in the body.

De Graaf was not content to simply demonstrate all of the advantages of his instrument. He was forced to defend it against the calumnies of the apothecaries. "We are beginning to hear," said he, "recriminations from certain apothecaries who state that this excellent instrument cannot be introduced without causing them considerable financial loss. But they are in error in this respect for the loss that may ensue as the result of administering fewer treatments is counter-balanced by the more frequent need of supplying the preparation required for the enema." "Without doubt" he states, "in fact under these new conditions physicians will prescribe enemas more frequently and willingly too, and the patient will consent to their use more readily since he can now insert the tip himself undercover without exposure and it will no longer be necessary on this account for an assistant to inject the fluid."

"It is to be further noted that the apothecaries are thus relieved of performing filthy and unnecessary treatments as commonly occur in dysentery, malignant fever (typhoid) and other contagious diseases.

[46] Cole, F. J., "The History of Anatomical Injections," in *Studies in the History and Method of Science*, ed. by Charles Singer, Oxford, 1921, Vol. 2, p. 297.

Furthermore they need no longer expose themselves to great danger for a small profit." As there was considerable antagonism between the pharmacists and those who in any manner attempted to interfere with any practices with which they were concerned in those days, it is not to be wondered that this new procedure of de Graaf, which could be carried out by the patient without assistance could easily precipitate a storm of discord and abuse. It is interesting to know that de Graaf thoroughly recognized the mentality of the pharmacist of his day, but he preferred to take recourse to persuasive measures rather than to violent invectives. On the other hand, there were others in those days whose attitude toward the pharmacist was far more bitter. Guy Patin [45] proclaimed violently concerning them:

Animal fourbissimum; faciens bene partes et lucrans mirabiliter. (Formidable animal; acting with vigor and gaining marvelously.)

To de Graaf we owe a debt of gratitude for perfecting the enema apparatus, for the additions and improvements which he suggested as well as for the technic in its use and for his instruction regarding its indications and contraindications, all of which were in advance of his day. But far more are we indebted to this young physician, whose life was too brief, for his many scientific achievements, which are still recognized today as notable contributions to medicine.

De Graaf's work " de Clysteribus " translated into French in 1878, contains a store of information regarding the use of the enema. He calls attention to various types of enemas among which are water alone and water mixed with oil and honey; however, he preferred the simple pure water enema or sea water to which there had been an addition of a small amount of salt or urine of a normal individual if the condition of the patient warranted more active treatment. He states, " these liquids have the power to dissolve hardened material in the bowel and at the same time stimulate the organ and cause expulsion of the dissolved matter. They therefore fulfill a double purpose." He calls to the attention of practitioners, especially those who are consulted by the poor, the fact that enemas composed of water and honey and of salt will afford relief at moderate expense. De Graaf states that enemas may be designated according to their composition; thus they may be emollient, purgative, astringent,

anodyne, detersive, diversant, consolidant and nutrient. Accordingly, enemas may be used with regard to the needs of various parts of the body. De Graaf refers to Rondelet, Wecker, Sennert and others who had formulated the composition of the various ingredients of which enemas may be composed.

Most interesting is his chapter on nutrient enemas.[45] He notes "that in extreme conditions when the patient is no longer able to ingest sufficient food, it is but natural to inquire if there is not a method of introducing nourishment through the bowel by means of an enema. Those who consider this possible, maintain that it is not absolutely necessary that the stomach digest the food in order to produce chyle, for the bowel has the power likewise to accomplish these changes. Enemas of wine, barley soup, milk, bouillon, yolk of eggs, etc., can be utilized for this purpose. These enemas should be administered in larger quantities and be more forcibly injected than usual in order to reach beyond the large bowel into the small intestine where they are absorbed."

De Graaf expresses his views regarding the absorption of nutrient enemas. He agrees with others that this is perfectly possible as to liquids but not with regard to solids.

Although he advises that enemas be injected high in order to reach the small bowel, he seems skeptical as to this possibility because of the inability to overcome Bauhin's (ileocecal) valve. "For," he states, "if one inflates the large bowel of a man, a pig or any other animal not a bubble of air can be forcibly injected into the small intestines. Thus it is proven that the injected nutrient cannot reach the small bowel to be digested there and there is far less reason to suppose that it can reach the stomach in this manner."

He likewise attempts to explain the method of absorption of nutriment from the bowel into the system and concludes that nutrient enemas are by no means as efficacious as many maintain. But he says "we cannot deny that enfeebled patients can be helped as the result of this procedure; however, we can only expect a limited benefit." This conclusion of de Graaf was later confirmed by Colson.[47]

De Graaf relates a very interesting story. He states that "contrary

[47] Colson, Édouard, *De la Méthode Intestinale*, Thèse, Paris, 1867, pp. 12, 42, 50.

to the nature of things, Bauhin's valve has been known to relax and open during an antiperistaltic movement of the bowel and the enema may thus be carried backward into the mouth. This has been observed by Galen, Sennert, Paré, Bartholin [48] and others; some of whom affirm that even suppositories have been passed through the mouth by the same route."

According to de Graaf, Sennert reported the following incident. It concerns a young girl of twelve years, suffering from chronic "iliac disease," who not only could not retain any food but also vomited nutrient enemas as rapidly as they were administered. This condition continued for three days. A large suppository was then introduced which according to Sennert was carried back into the stomach and then vomited within the time required to invoke a "Pater Noster" and an "Ave Maria." A second suppository with a thread attached was then inserted, but the thread became detached and like the preceding one was vomited by the patient with a bit of broken thread. A third suppository attached to a stronger thread followed the identical course and was expelled by mouth with fragments of broken threads. At last the physician ordered a fourth suppository but the peristaltic movements became so violent that the mother of the girl hastened to withdraw it fearing that it would follow the same course as the others. We are assured however, that the patient finally recovered.

In his works de Graaf refers to various procedures to be followed in administering enemas. "The clyster should be administered in variable quantities depending upon the age of the patient; for the infant it should be three ounces; for the adult he ordinarily prescribed six ounces. In pregnancy the quantity should be regulated in diminishing quantities with an increase in development of the foetus. The amount should also be regulated in patients with stones or with inflammatory conditions of the kidneys as well as in individuals who are not very strong or in the presence of unusual intestinal distention."

"Enemas should be given tepid at times, warmer when there is

[48] Bartholin, Thomas, *Acta Medica et Philosophica Hafniensia*, Ann. 1671 and 1672, 1673, Pars I, Chap. XXXVIII, p. 69, Dolor Intestini recti; also Ann. 1674, 1675, 1676, Vol. IV, Pars I, Chap. XIV, p. 18, Instrumentum Novum quo liquores injicuntur in praeparationes viscerum.

an excessive amount of mucus in the stools or when the patient is suffering greatly from abdominal gas. In fevers they should be cool."

" Enemas must be retained for a variable period of time according to the condition at hand. For simple cleansing of the bowel this should be continued for over a half-hour, for soothing abdominal pains longer. Those intended for purgation are usually expelled at once. If there is too long a delay a suppository is inserted to hasten expulsion."

" Physicians are not in accord as to the position which the patient should assume in receiving an enema. Some consider the right side best, others the left. Those who claim advantage for the right believe there is a better tendency for the fluid to flow higher in this position as there is no tendency then to compression of the left bowel or splenic area." As for us, states de Graaf " we have reached the conclusion based upon our knowledge of the human anatomy, acquired through numerous dissections of cadavers, that it is quite immaterial whether the patient reclines on either side. If we were forced to indicate our preference for a definite position we would have the patient recline upon his back. Under such a condition, there could not possibly be any question of compression either from the right or left side."

The enema was recommended by de Graaf for the treatment of various intestinal disturbances such as colic, tenesmus, diarrhea, ulcerations, worms, etc. " It is also effective in disturbances of the bladder, kidneys, uterus, etc. It is useful in the relief of headaches as well as in the treatment of all fevers."

He refers to the fact that it may become necessary to prepare the way for effective purging and also for overcoming impaction and quotes Galen's statement that " sometimes it happens that the feces are so hardened and dried out in some part of the bowel as to prevent evacuation unless by the use of enemas." " We can only state," de Graaf concludes " that the very ill patient is in error in refusing to allow the use of enemas in preference to purging. He risks his own life, and injures the reputation of the doctor. For an untimely purge can cause death and it is often far better to submit to several enemas, one following the other than rely upon a single purgative."

" The enema empties the bowel without producing any discomfort nor does constipation follow its use as often occurs with purgatives." For the old, he especially counsels the use of oil.

It is quite evident that de Graaf, in his wisdom, recognized the danger of purgatives in certain conditions, a fact which is accepted today as a matter of the greatest importance in the treatment of some acute affections such as appendicitis and obstruction of the bowels.

In summing up the work of de Graaf, aside from his memorable contributions in the pancreatic and genitourinary fields to which attention has already been directed, he left an impress upon medicine by his studies on the use of the enema, for he not only perfected and simplified the apparatus for its administration, i. e., the flexible intermediary tube is still utilized today, but he also established the fact that highly medicated enemas were unnecessary and that simple water with perhaps the addition of salt and honey were quite as effective. He also demonstrated that nutrient enemas were of but transitory value. Similarly he gave advice as to the quantity of fluid to be injected, its temperature, the length of time for the retention of the enema and the position to be assumed by the patient while undergoing the procedure. All in all, it may truly be maintained that he manifested a knowledge of this process which was far in advance of his time.

Improvements in the structure of the syringe were suggested from time to time. Of these the one of Thomas Bartholin [48] is especially noteworthy. Bartholin, who was professor of Anatomy in Copenhagen, employed his syringe at first for the injection and study of the vascular system and published a work on this topic. It is interesting to note that he also advised the use of suppositories for the relief of intestinal colic.

The enema actually played an important rôle in French history at a period long before the time of de Graaf. The story is told that in March of 1480 Louis XI was stricken with apoplexy from which he nearly succumbed. An Italian physician, Angelo Catho by name, attended him. He ordered the windows, which hitherto had been hermetically sealed, to be elevated and he also prescribed an enema for His Majesty. It is said that as a result of the raising of the

windows together with the use of the enema wealth and honor were bestowed upon Angelo Catho.[49] The reputation of this physician was widely heralded as the result of the opportunity afforded him to utilize the enema for the treatment of habitual constipation in the case of a Sovereign. Nothing more was required to secure the favor of Louis XI. The King rewarded him for his services by promoting him and presenting him with a pension of 60,000 francs. Louis XI was so imbued with the virtue of the enema that he even had this treatment administered to his dogs.[50] When his pets became ill they were placed on a small feather bed and treated by means of a copper syringe which in itself is proof sufficient that the syringe was well known in the 15th century. Up to the 16th century the clyster remained in the hands of the apothecary as this constituted an important part of his profession. The great movement of the Renaissance was necessary, however, to popularize it.

The first syringe in the possession of any prominent individual was the property of a treasurer of France, Sir Philippi Babou de la Bourdaisiere.[51] It was fashioned in silver and bore the date of 1536. Curiously it had the lettering of "c" for syringe instead of "s." Most of those ordinarily used in those days were made of copper or brass.

Syringes of porcelain, gilded silver and mother-of-pearl are still to be found. At that period embellished ones were often in the possession of ladies and were placed among their toilette accessories to serve as ornaments. It was rumored that Madame de Pompadour [52] had a luxurious display in her perfumed boudoir.

Louis the Thirteenth possessed a large and beautiful collection. His father, Henry the Fourth [53] had accustomed him even at an early age to recognize the importance of this form of treatment although the King himself was not especially favorably inclined to

[49] See Chereau, "Les médecins de Louis XI (1461-1483)," *L'Union Médicale*, Nouvelle Série, Vol. 16, Paris, 1862, p. 145.

[50] Monteil, Amans Alexis, *Histoire des Français des Divers États, ou Histoire de France aux Cinq Derniers Siècles*, XV^e^ Siècle, Vol. II, 3 ed., Paris, 1847, pp. 352 (86) and 559 (86). This contains a complete description of the treatment of the dogs and the expense account connected with their care.

[51] Cabanès et Witkowski, *loc. cit.*, p. 34.

[52] Phillippe, A., *Histoire des Apothicaires*, etc., Paris, 1853, p. 103.

[53] Lagrèze, G. B., *Henri IV, Vie Privée Details Inédits*, Paris, 1884, p. 189.

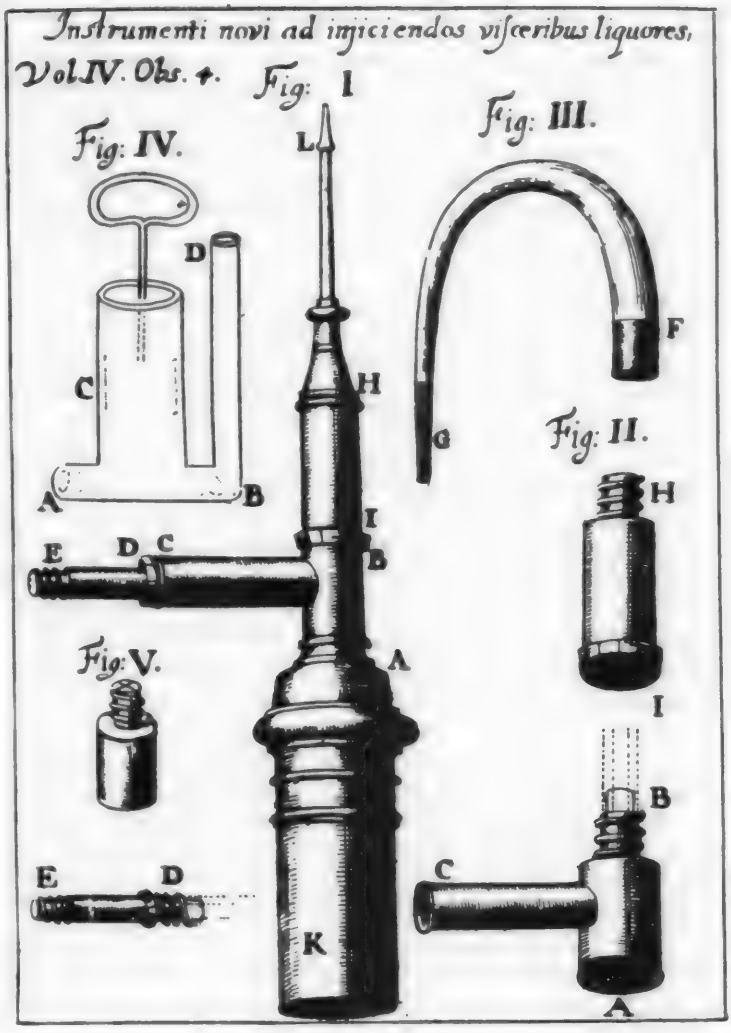


Fig. 9.

[From Thomas Bartholin, *Acta Medica et Philosophica Hafniensia*, Ann. 1674, 1675, 1676, Vol. IV, Pars I, Chapter XIV, p. 18.]

this procedure. It is well known, that Louis was an exceedingly difficult child and one day, remarks his tutor,[54] he was required to submit to an enema which he bitterly resented and which was finally given under great difficulties. He flew into a temper and shouted "I prefer to die." On another occasion when complaining of abdominal pain his physician again ordered an enema. Unwilling to have it, he carried on a dispute with the apothecary. The Queen arrived but her persuasion was of no avail. Finally he was threatened with a spanking and then submitted to the treatment.[55]

However, he continued to quarrel from then on whenever an enema was prescribed. On another occasion a clyster prepared of milk, camomile, flour and sugar was to be given him. After many curious excuses he finally submitted on the threat of a spanking. In a rage he cried out, "if I had a switch I would force you (the apothecary) to submit to an enema yourself." After a time when given an enema of almond milk, he was so relieved that from then on there was little difficulty in persuading him to yield to this procedure. It was calculated that he had been given 212 enemas, 215 purgations and 47 venesections by his physician Dr. Charles Bouvart [56] within a single year. A letter which was addressed by Bouvart [57] to Cardinal Richelieu, then Prime Minister gives a fair idea of the practice of this physician. He states:

Milord:

I mentioned last night to the gentleman who spoke to me in your behalf, that the King had enjoyed good health, but fearing the effect of two large repasts, I held myself in readiness. This was actually found necessary last night for as the result of distention he felt full and uncomfortable. This condition disappeared however, following evacuations brought about by means of two enemas. He rested very well between the two and is still sleeping. Bouvart.

Cardinal Richelieu [58] himself did not escape the use of the pro-

[54] *Journal de Jean Héroard sur l'Enfance et la Jeunesse de Louis XIII (1601-1628)*. Poublié par E. Soulie et E. de Barthélemy, Paris, 1868, T. I, p. 339.

[55] Héroard, J., *loc. cit.*, T. II, p. 62.

[56] Amelot de la Houssaye, *Mémoires Historiques, Politiques, Critiques et Littéraires*, T. I, Amsterdam, 1722, p. 518; see also Phillippe, *loc. cit.*, p. 110.

[57] Bouvart, C., *L'Union Médicale*, 3rd Série, Paris, Vol. 22, 1876, p. 883, under title "Éphémérides médicales" of December 9, 1633.

[58] Cabanès et Witkowski, *loc. cit.*, p. 36.

cedure for it is claimed that he received 75 clysters administered by his apothecary Perdreau during the year 1635.

In the 17th and 18th centuries syringes of silver were rare and Dufort de Cheverny [89] in his memoirs recounts how the grandson of Samuel Bernard, A. G. Henry Bernard, never travelled without carrying along considerable baggage. His luggage was as extensive as that of any female. He even had with him a warming pan and silver syringe.

The apothecary Riclet of whom Agrippa d'Aubigne [88] speaks, carried a syringe and chamber attached to his saddle when on horse. He was contented however, with a copper apparatus.

Not long after this Helvetius [24] introduced the use of ipecac into France as a secret remedy for the treatment of dysentery and utilized it at times in the form of an enema. His success with these cases became known to Louis XIV who developed great interest in this drug due especially to the rapid recovery of the Dauphin who had been a victim of this disease. In 1686 he rewarded Helvetius with a large sum to part with his secret for the benefit of the French Government.

The enema was likewise well known in Spain. Cervantes,[90] in his adventures of Don Quixote early in the 17th century, alludes to its use. Don Quixote narrates to Sancho that the lives of knights-errant are subject to a thousand perils and as an illustration states, "The Knight of the Sun being caught by a trap door which sunk under his feet in a certain castle, found himself underground at the bottom of a deep dungeon bound hand and foot, where he was administered a clyster of snow water and sand that almost distracted him."

Drawing attention to their horses Dapple and Rozinante in another passage, the author compares their friendship to that of Nisos and Euryalus or that of Pylades and Orestus. "How steady then must have been the friendship of these two peaceable animals to the shame of men who are regardless of its laws. Nor be it amiss that any

[89] Dufort, J. N., Comte de Cheverny, *Mémoires sur le Règne de Louis XV et Louis XVI*, Paris, Vol. I, p. 33; also Cabanès et Witkowski, *loc. cit.*, p. 34.

[90] Cervantes, Miguel de, *The Adventures of Don Quixote de la Mancha*, Spencer Press (Cuneo Press Edition), Part 1, Book 3, Chapter 15, p. 65 and Part 2, Book 1, Chapter 12, p. 341.

comparison should be made between the mutual cordiality of animals and that of men. We are indebted for example to the stork for the clyster and for emetics to the dog; from which animal we may learn gratitude; as well as vigilance from cranes; foresight from ants; modesty from elephants and loyalty from horses."

In the first years of the reign of Louis XIV, the grand monarch, the use of the enema became an extremely popular method of treatment in France marking the age of the "triumph of the clyster." These were the days in which Molière produced his plays "Monsieur de Pourceaugnac" and "Malade Imaginaire" in which in a very satirical vein he attracted attention to the use of this treatment. De Graaf's apparatus was largely publicized by these plays.

Some individuals became very expert in administering the enema. However, certain very modest and prudish women[61] refused to recognize these experts, prepared their own enemas and carried out the procedure themselves.

It soon became fashionable to indulge in this treatment and the aristocratic females began to practice it as often as three to four times daily as an effective procedure to improve the complexion and retain a youthful appearance. And thus at this time, the clyster was recognized among these individuals in the light of a fountain of youth, to clear up and freshen the complexion of women even beyond fifty years and thus of triumphing over the ravages of age. "If one of these noble ladies was questioned she at once replied, that she owed her charm to "Ninon de Lenclos." But she so admired your surprise that she finally leaned over politely toward you and whispered, "Have you ever taken an enema?"

And so apothecaries vied with one another in preparing such colorful and fragrant enemas as of orange blossoms, roses, bergamot and lilies. It was admitted that the administration of the enema was not always a simple procedure and when not skillfully applied certain difficulties might be encountered.

Definite instructions were advised in the preparation of the patient and administration of the enema. "The position of the patient must be comfortable, the syringe properly directed and the piston moved slowly and gently so that the fluid flows in mildly and not in torrents

[61] Phillippe, *loc. cit.*, pp. 110, 111, and 112.

into the bowel. The piston must operate smoothly under the hands of the attendant and without effort and the tip, to be inserted, must be smooth so as not to cause injury to the tissues."

The administration of the enema now developed into a real ceremony. The clyster was installed in every home and its virtues were greatly extolled. Following the practice of the King and Court, it developed into a very popular remedy. It was not long however, until as is common with all new forms of treatments, it was frequently employed without any real indication and was misapplied and over-used and consequently made the subject of many satirical jests which were largely intensified not only by the plays of Molière but by others in comedies, poems and satires.

The clyster was likewise well recognized in Italy at this period and a Tuscany [62] saying is, " Acqua dictor e serviziale gnarise ogni male," that is " Water, diet and clyster heal all disease." The treatment became known popularly and was recognized as Molière's " instrument " or " word."

In act one of Monsieur de Pourceaugnac,[63] the apothecary remarks to Monsieur Pourceaugnac, " Monsieur, this is a little remedy, a little remedy, which you need and must take if you please." " What " says Pourceaugnac, " What? I have no need of this! "

The Apothecary: " It has been ordered Monsieur, it has been ordered."

Monsieur de Pourceaugnac: " Oh! what a row."

The Apothecary: " Take it Monsieur, take it, it will not harm you any."

Monsieur de Pourceaugnac: " Ah! "

The Apothecary: " It is a little injection, a little injection, gentle, gentle; it is gentle, gentle, there take, take, Monsieur; it is to purge, purge, purge."

The two musicians accompanied by mummers and instruments dance around Monsieur Pourceaugnac and stopping before him sing:

[62] Hovorka, Oskar v. and Kronfeld, A., *Vergleichende Volksmedizin*, Stuttgart, 1909, Bd. 2, S. 118.

[63] Molière, " Monsieur de Pourceaugnac," in *The Plays of Molière in French and English*, by A. R. Waller, Vol. VI (1668-1669), Edinburgh, 1926, Act I, scene II, p. 289 and Act II, scene IV, p. 299.

" Take it quickly Seignor Monsieur take it, take it, take it quickly. It will not do you any harm. Take this little physic quickly, take it quickly, Seignor Monsieur, take it, take it, take it."

Monsieur de Pourceaugnac: " Go to the devil," and flies away. The apothecaries and the two musicians follow after him each carrying a syringe.

Many other ludicrous remarks concerning the enema are to be found in the plays as Molière ridicules the treatment.

In " Le Malade Imaginaire " [64] the following allusion to the enema occurs in addition to others.

M. Purgon (the physician): " I have just heard a bit of news at the door, that my prescriptions are being made game of here and that remedies which I have prescribed are being refused."

Argon (the hypochondriac enjoying ill health):
" Monsieur it is not true."

M. Purgon: " This is a very daring thing to do, an unnatural revolt of a patient, to take up arms against his doctor."

Toinette (the maid): " It is shocking."

M. Purgon: " A clyster I have taken pleasure in mixing myself. Invented and made according to all the rules of art."

Toinette: " It is an offense to disobey."

M. Purgon: " Which was to have a marvelous effect on the bowels. It was monstrous conduct, an enormous crime against the medical faculty. A crime of high treason against the profession which cannot be sufficiently punished. I vow I will cease to treat you."

Further on Argon says: " It is my brother who has done the mischief by advising me badly."

M. Purgon: " To sneer at my clyster! "

Argon: " Bring it here, I will take it."

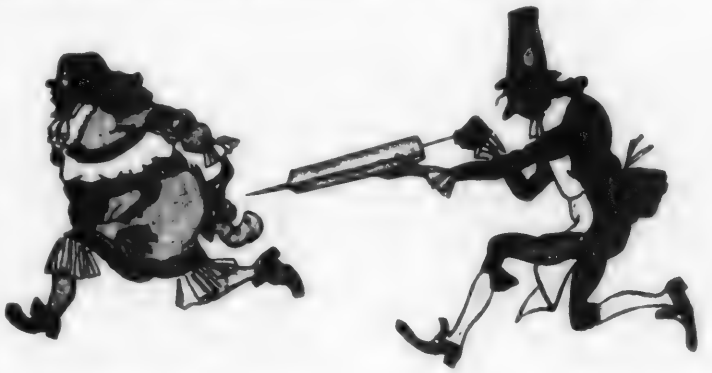
Towards the end of this comedy the chorus sings

" Clysterium donare
Postea saignare
Ensuitta purgare "

[64] Molière, " Le Malade Imaginaire," in Waller, *loc. cit.*, Act. I, scene I, p. 183.

The first edition of " Le Malade Imaginaire " [65] printed in France was dated 1675. It was published under the auspices of the widow of the author in order to overcome an incorrect impression produced by the foreign editions.

Without question Molière succeeded by means of his plays in attracting attention to the use of enema which accomplished much in making it a fashionable procedure. The royalty adopted it as a



„M. DE POURCEAUGNAC" (MOLIÈRE) JOSEPH HÉMARD

Fig. 10.

[From Cornelis Veth, *Der Arzt in der Karikatur*, Berlin, p. 15.]

popular practice. At this period the employment of the enema had spread freely into social circles. The treatment became a matter of general conversation and there were few important personages who were not the recipients of this treatment. The French literature contains innumerable references to this procedure often practiced among the French royalty in an effort to counteract the indiscretions in food. In later years this period was often designated as the " age of the clyster."

Authors did not hesitate to commonly employ the word lavement. Madame de Sèvigne [66] writes " I understand that M. d'Hacqueville

[65] Raynaud, Maurice, *Les Médecins au Temps de Molière, Moeurs, Institutions, Doctrines*, Paris, 1862, p. 417.

[66] Cabanès et Witkowski, *loc. cit.*, p. 45.

Fig. 11.

[From *La Revue des Spécialités*, 5 Année, No. 3, Mars, 1925, p. 91.]

tells you all the news. I know of none but I think it proper to inform you that the Chancellor was given a lavement."

The following story is told by St. Simon.[67] " One evening preceding the performance of a comedy to be given at the theatre at Versailles, the princess dressed in her evening clothes, stood with her back to the hearth leaning on the little screen between two tables. Nanon Balbien, the former maid of Madame de Maintenon, passed back of her and appearing to have one hand in her pocket knelt behind her. The King who was standing near by became cognizant of the unusual performance and inquired as to what was happening. The princess burst out in laughter. They hesitated to state but the King insisted. " Do you really insist on knowing? " she said. " I am taking an enema of water." " What! " exclaimed the King. " You are taking an enema here! " " Why certainly," she said. " And how is this possible! " and they all burst forth in laughter. The fact is that Nanon actually brought the syringe already prepared under cover in her skirts, raised the princess' dress who in turn held them up as if she were warming herself and Nanon then administered the treatment. The skirt fell and the instrument kept from sight was carried off by Nanon. The remarkable part of the incident is that the princess while still retaining the enema was able to remain throughout the performance without feeling the need of expelling it. At certain times she even delayed in this regard until after the supper and the King's reception. She claimed that the enemas refreshed her and prevented the onset of a headache in the over-heated reception room.

Another story is told by St. Simon.[68] Estoublon, a practical joker, passed by the room of the beautiful M'de. de Brégis which opened on a portico at St. Germain. He found the door ajar, entered and observed that M'de. de Brégis was reclining in a position which he recognized as the one in which an enema is ordinarily applied. Furthermore, the apparatus already prepared was lying nearby ready for use. He slyly and without the slightest realization on her part as to who was there gave the enema, removed the syringe

[67] *Mémoires de Saint Simon*, Nouvelle édition par Boislisle avec la collaboration de L. Legestre et J. de Boislisle, 22 Vol., Paris, 1910, p. 285.

[68] *Intermédiaire des Chercheurs et Curieux*, 1878, No. 250, p. 596; and 1884, No. 397, p. 694.

and cautiously escaped from the room. When the maid reappeared she attempted to administer the treatment but M'de. Brégis protested vehemently. There ensued a heated discussion which finally ended by the maid finding the syringe empty. Knowing of no other explanation, M'de. Brégis finally arrived at the conclusion that the enema must have been administered by the devil himself.

An interesting law suit arising as the result of the use of the clyster was settled on May 5, 1746. The proceedings dealt with the case of Tinnette Boyau,[68] a nurse, versus Francois Bourgeois, a Canon of Troyes. Tinnette had administered 2190 enema treatments over a period of two years to this gentleman for which she rendered an account of 150 pounds for her services or two sous, six deniers per treatment. The Canon refused payment even after frequent solicitation and as a consequence following a long delay, a court procedure resulted. Her attorney pleaded that Tinnette had enjoyed an exemplary reputation, had served individuals of the greatest distinction and was highly regarded for her zeal and her dexterity. Moreover, she was not wealthy and her fee was by no means excessive. Following a long procedure during which the most eminent authorities were quoted, her lawyer called attention to the disgrace involved in withholding payment to employées and the urgency of proper recompense for services of this character. The Canon demurred for a long time, but finally, due to the attitude of the audience together with the fear of the publicity to which he would be subjected, relented and acknowledged the debt.

While Madame de Maintenon's [70] influence was maintained over the court of Louis 14th the term " lavement " became a most popular expression. However, the treatment fell into non-medical hands, was greatly abused and in consequence, its prestige suffered from the satire of Molière and the jests of many others. Ridicule became so pronounced that under the combined influence of Madame Maintenon and Father Letellier, the king's confessor, an attempt was made to displace the term " lavement " by another, " remedy."

There were likewise certain other individuals who due to their modesty likewise preferred the use of the term " remedy " instead

[68] Grosley, *Les Troyens Celèbres*, T. II, p. 248; also Phillippe, *loc. cit.*, p. 118.
[70] Cabanès et Witkowski, *loc. cit.*, p. 52; also Phillippe, *loc. cit.*, p. 108.

of " lavement " and urged the change. The aid of the Jesuits was enlisted in this attempt by winning over Abbé Saint Cyran who at that time was in favor with Louis 14th but the Abbé in a public statement placed the blame on Father Garasse for insisting on the

Nous terminerons par ce mémoire facétieux, œuvre de Grosley, avocat à Troyes, l'historique du Clystère.

Fig. 12.

[From Cabanès et Witkowski, *Joyeux Propos d'Esculape*, Paris, p. 121.]

retention of the term. Said Father Garasse, " I understand the term to signify local bath. It is actually the apothecaries who have profaned it and given it a misleading meaning." However, it was finally decided to employ the term " remedy " instead of " lavement." The King was in accord with the change of name and the Academy received the order to insert the new term in the next edition of the dictionary. His Majesty consented to instruct his apothecary no

longer to apply the term " lavement " for this procedure but to substitute the word " remedy." However, it was but a short time, for the old term lavement soon came again into general usage.

About this time Louis the 14th who so greatly favored the use of the enema developed abdominal colic while on his way to the country. Enema after enema was administered by his physician Vallot, but with only temporary relief and after numerous treatments he became so harassed from the procedure that he finally refused it. However, he was soon relieved of his distress by an operation for fistula. From then on he became a bitter opponent of this treatment.

On March 6, 1709, he again began to suffer with pain. Dr. d'Aquin, who was his physician at this time, ordered enemas again to which he reluctantly submitted and he was temporarily relieved.

In " Gil Blas " [71] of Alain René Le Sage, the first French novelist, ably translated by Smollet, the hero Gil Blas narrates, " I have already observed that Jacinta though somewhat superannuated had still a freshness of complexion. True indeed she spared nothing to preserve it, for besides a clyster, which she took every morning, she also swallowed some excellent jellies of her own composing during the day and when she went to bed she slept soundly all night."

A novel entitled *L'Apoticaire de Qualité*,[72] describing adventures with the enema, appeared in 1670. In it the heroine dreams of the treatment. A chapter is devoted to a beautiful woman who was the recipient of lavements.

The extremely grotesque ceremony occurring in administering the enema to Louis 15th is told by the Duke de La Rochefoucauld Liancourt in the following narrative: [73]

On Wednesday, April 27, 1774, Louis the 15th believing that his indisposition was due to simple indigestion secluded himself in the apartment of Madame Du Barry, where he relieved himself by means of several enemas. He refused to consult a physician at that time.

[71] Le Sage, Alain René, *The Adventures of Gil Blas of Santillane*, trans. from the French by Tobias Smollett, M. D., Vol. I, Book 2, Chap. 1, p. 115.

[72] de Villiers, *L'Apoticaire de Qualité, Nouvelle Galanterie et Veritable*, Cologne, 1670, pp. 4, 9, 25.

[73] " Relation de La Rochefoucault-Liancourt," *L'Intermédiaire*, Nov. 10, 1896, col. 589.

On Friday the 29th, it became necessary to repeat this treatment and he was placed in the proper posture for the procedure. The apothecary with two assistants arrived and they together with the physician stood at the bedside. While administering the treatment the heat produced by the candle appeared so intense that the assistant of his own accord, for fear of burning his Majesty, attempted to moderate it by placing a hat in front of the candle. This disturbed the operating apothecary greatly and he seemed to have considerable difficulty in inserting the tip. The apothecary seemed greatly annoyed, the doctor appeared amazed and he together with the others had great difficulty in restraining their laughter.

It is said that Falconett,[74] a physician of Louis 15th, who was recognized as a glutton, utilized enemas after each repast, in order to prevent the onset of discomfort following meals.

A very curious custom [75] was followed in the court of Louis 16th. Every maid of honor when enlisting upon her duties was interrogated as to whether she had completed her toilet. This signified that any female attendant who held any position at court prior to her daily service was required to submit to one, two or even as many enemas as might be found necessary so as to avoid any interference with her daily duties.

Such abuse of the enema was practiced during the 18th century that a pharmacist, Nicholas Lemery [76] of that day remarked: " Enemas are the best and most effective remedies in medicine when indicated but are greatly abused inasmuch as many individuals accustom themselves so unduly to remedies of this sort, undergoing such treatments daily in health as well in disease, that their digestive tracts become so weakened that they no longer are capable of performing their functions normally. The object of the enema is to cleanse the tract but in accomplishing this the digestion must not be disturbed for it is quite normal for a certain amount of excrement to

[74] Roger de Parnes et Georges d'Heilly, *Anecdotes secrètes du règne de Louis* XV, Paris, 1882, p. 55.

[75] *Journal des Goncourts*, Mémoires de la Vie Littéraire, Oct. 2, 1864, T. II, p. 222.

[76] Lemery, Nicholas, *Pharmacopie universelle, contenant toutes les compositions de pharmacie qui sont en usage dans la médecine, tant en France que par toute l'Europe*, etc., Paris, 1698, p. 86.

remain in the bowel. As the result of the daily use of enemas the patient is depleted and he is thus rendered far more susceptible to disease." These remarks are highly significant and are an indication that certain individuals even at that time recognized the absurdity of daily enemas unless definitely indicated.

The enema actually received recognition in art as is revealed by the numerous publications of prints some of which were even interpreted in verse. Such artists as Lawreince, Fragonard, Beaudouin, Schall and many others have pictured this procedure in various forms.[77] The enema was represented not only in prints but in paintings, ceramics, and decorations. A curious picture on a porcelain dish is to be found in the Ceramic Museum of Rouen [78] which represents an apothecary with his assistant administering an enema to a female. This platter is indicative of the work of the second half of the 18th century. It is exquisitely patterned and reveals a perfect knowledge of the procedure. The principal personages in this platter are pictured in a courtyard surrounded by a garden in the background. A stout individual is lying on a heap of straw with her head on her arms. The apothecary is represented with hat administering the enema. A portion of the injected fluid is leaking aside of the apparatus soiling the straw. A commode is pictured in the foreground. On the table are remnants of a meal.

A medical journal published in 1905 pictures a copy of a water color of the seventeenth century. It represents a part of a collection of a Turin artist, Biscarra. The enema is represented as given in a curious fashion through a funnel shaped tube.

In what was once the apartment of Cardinal Rohan at the Hotel de Rohan, and which is at present occupied by the National Printing Press, are graceful murals [79] attributed to Huet, in which apes caress one another in a more or less grotesque manner, at the same time brandishing an enema apparatus as a play toy.[80] In de Goncourt's art of the 18th century there appears a reference to a very beautiful pen sketch dated 1779 by an anonymous artist entitled "The Clystre."—"The Apothecary and his Patient."

[77] Cabanès et Witkowski, *loc. cit.*, p. 67.
[78] Derocque, Dr., *Revue Médicale de Normandie*, Feb. 10, 1905.
[79] Havard, *Dict. de l'Ameublement*, T. IV, col. 952, art. "seringue."
[80] de Goncourt, Edmund and Jules, *L'Art du XVIII^e Siècle*, Paris, 1881.

Fig. 13.

[From Cabanès et Witkowski, *loc. cit.*, p. 69.]

Fig. 14.

[From Cabanès et Witkowski, *loc. cit.*, p. 70.]

While artists were still exercising their talents in representing the enema in a variety of fashions the genius of the humorists led to certain satirical remarks regarding this procedure.

In 1718 there appeared a satirical poem by Eustache Lenoble [81] entitled " L'Allé de la Seringue." The story is told that Eustache Lenoble's father, who was president of the Township of Troyes had planted a row of walnut trees in front of his chateau located in the neighborhood of Troyes. Certain of these trees encroached upon the property of a M. Guichard de Vouldy, Counsellor of the township. M. Guichard had them summarily removed. This led to a dispute. A court procedure ensued in which M. Tettel and Cappois who were counselors of the village, took the part of M. Vouldy. Eustache Lenoble, son of the president, composed a poem as the result of this suit which he entitled " L'Allé de la Seringue " (Passage of the syringe) as both M. Vouldy and Cappois were sons of an apothecary.

In the course of the poem the author proclaims:

> On the one side in back of a dusty office sits
> His paternal ancestor with acrimonious claws and eagle eyes
> In order to fatten himself with the blood of an unfortunate litigant
> Fomenting discord adroitly with deceitful chicanery.
> On the other side one sees Cappois the apothecary
> Directing a clyster toward the ill Troyen
> Administering on bent knees with syringe in hand
> The unspeakable appliance of a most despicable profession.

Toward the end of the 18th century the Academy of Macon submitted the following topic as a prize, " What invention has been the most useful to man? "

One of the contestants contented himself in sending his answer in two words—

" The Syringe "

The syringe was honored by more than one title; it was proclaimed the " Queen of the World " [83] because it had reigned in Europe without interruption for three hundred years. In such esteem was this instrument held in those days.

[81] Lenoble, Eustache, *L'Allé de la Seringue*; see also Phillippe, *loc. cit.*, p. 104, and *Oeuvres de Lenoble*, T. 16, Paris, 1718.

[83] Phillippe, *loc. cit.*, Chapter VI, p. 102.

It is interesting to recall some less frequently employed uses of the syringe. A curious use made of it up to the 17th century was as a fire extinguishing apparatus.[83] It was also utilized in smaller form and caliber to project perfumes into rooms. Such syringes were often manufactured from precious metals and were frequently ornamented.

The syringe has likewise played its part in the field of sorcery [84] as well as in religious practice.[85] Holy water was injected by means of the intrauterine douche in the baptismal ceremony of infants, whenever the slightest question of danger to life occurred. It was likewise employed to inject fluids within the genital canal of females by obstetricians, special types of apparatus being utilized for this purpose.

It is interesting to note that the enema was also taken advantage of by unscrupulous individuals as a means of administering poison.[84] This occurred especially in the 17th century. A poisonous substance could thus be injected in solution which could not be detected by the patient, no matter to what degree his suspicion might have been aroused. It could not however, be employed in this manner very frequently but, on the other hand, has often been used as a means of injecting poisons for suicidal purposes.

The enema apparatus was further utilized for the injection of mercury into the bowels in the treatment of certain cases of syphilis. According to Cabanès and Witkowski, a library catalogue mentions the use of this procedure in the 18th century by Royer.[86]

It is of interest to note that phobias, quite similar to those observed with other treatments, were occasionally noted associated with the enema. Cabanès and Witkowski [87] present the following narrative. A certain female to whom an almost boiling hot enema was acci-

[83] *Arch. Commun.*, série BB, reg. 190.

[84] Cabanès, A. et Nass, L., *Poisons et Sortilèges*, 2. série, Les Médicis, Les Bourbons, La Science au XX^{e} Siècle, Paris, 1903, p. 207.

[85] Maruitte, Émile-Jules-Alfred, *Paul Portal*, Thèse de Paris, 1900; also Witkowski, G. J., *Histoire des Accouchements*, Paris, p. 146.

[86] Royer, Thomas, *Dissertation sur les lavements en général, et particulièrement sur une méthode nouvelle de traiter, par ce moyen, les maladies vénériennes*, Paris, 1778.

[87] Cabanès et Witkowski, *loc. cit.*, pp. 104 and 88.

dentally administered at one time was so completely upset by this procedure that she fainted ever after, at the mere sight of a very small syringe. Her son, who had inherited the phobia fell sick and was sent to a hospital where an enema was prescribed for him in spite of his opposition to the procedure. Suddenly the young man expired, evidently as the result of fright.

A second instance of this type of phobia has also been described. The incident was published in the *Journal de Pharmacie* 1815, page 326.

"A young nobleman was taken ill with high fever associated with a digestive upset. His physician prescribed an enema. He protested that he would sooner die than submit to this indignity and that neither any member of his family nor one of his rank had ever before been dishonored in this manner. The physician, however, insisted on carrying out this procedure. The young man succumbed, it is said, due to chagrin and the physician had great difficulty in convincing the family that death could not have been due to the treatment."

(*To be continued.*)

Fig. 1

THE COMPANY OF UNDERTAKERS . . .

Beareth Sable, an Urinal proper, between 12 Quack-Heads of the Second and 12 Cane Heads OR, Consultant. On a Chief Nebulae, Ermine, One compleat Doctor issuant, checkie, sustaining in his Right Hand a Baton of the Second. On his Dexter and Sinister sides two Demi-Doctors, issuant of the Second, and two Cane Heads issuant of the third; The first having One Eye couchant towards the Dexter side of the Escocheon the second Faced per pale proper & Gules, Guardent. With this Motto.

Et Plurima Mortis Imago.

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AN INTERPRETATION OF THE HOGARTH PRINT "THE ARMS OF THE COMPANY OF UNDERTAKERS" *

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Introduction

Referred to under various titles, such as "The Arms of the Company of Undertakers," "The Company of Undertakers" and again as "A Consultation of Physicians" and reproduced in numerous publications, this curious sample of Hogarth's art is familiar to everyone who has interested himself in the study of the history of medicine. Far from being a simple sketch of some of the well known characters of the times, this excellent specimen of Hogarth's works satirizes the medical profession, shows well the artistic touch in the grouping of the figures who are caricatured and reproduces a coat of arms which is described in its technical detail in true heraldic form.

Few if any who refer to this print, or who describe it, have taken the trouble to interpret Hogarth's heraldic description and I fancy to the majority of readers, the lines underneath the coat of arms have but little meaning. The purpose of this paper is more particularly to show that with a proper translating of the terms used, a better understanding of the print is at once obtained.

The print itself is looked upon as one of Hogarth's best, and this particular copy from the collection of the late Dr. Thomas McCrae, is excellent in the clearness of its design. One gathers from the detailed description of Hogarth's works by Dobson (1) that Hogarth not only designed the engraving but actually executed it himself. One gathers further that it is not a drawing made from a portrait, no such portrait is listed in Hogarth's works.

Living in the 18th century, Hogarth saw quackery in medicine at one of the crests of its many waves. That element in his composi-

* Read before the Medical Historical Club of Toronto, March, 1939.

tion which had prompted his many efforts at reforming the vices of the day by caricature and satire, recognized the brazen effrontery of the charlatan about him, and his amusing print " The arms of the company of undertakers " may be taken as representing his idea of the real character of some of the idols of the unthinking multitude, royalty not excluded, for two of the characters in the print attained the exalted positions of " court physicians."

Hogarth probably had some knowledge of heraldry, for though he had begun life as a silversmith, he had progressed to the higher branch of his art, that of engraving crests and book plates on copper. It is hardly likely with this experience that he would be entirely ignorant of what is called " the science of heraldry " and further we know that one of his prints, " The gates of Calais " was made directly as a result of his having been detained by the French authorities at Calais, because they suspected him of ulterior motives when found making copies of the English coats of arms which stood over the port gates. One can hardly agree with Dr. Bennett (2) that in the designing of " The arms of the company of undertakers " Hogarth was " poking fun at a science with which he had but small acquaintance." The heraldic markings on, and the description of, " The arms of the company of undertakers " will probably be found to be more or less in accord with the rules which govern the science of heraldry, though some omissions in description of minor import are in evidence, and a humorous and satirical insertion here and there is perhaps only what could be expected when one considers the artist and his subject.

Some explanation of the meaning of heraldic markings is in order if one is to follow Hogarth's legend. Amusing errors are seen here and there in various descriptions of the print, errors which indicate that unimportant as heraldry may have seemed to this or that writer, it would yet have been wiser to have left the interpretation of the coat of arms to someone who at least knew the A. B. C.'s of the subject. For instance in an excellent account of the life of Chevalier Taylor, the charlatan oculist, by Coates, (3) Taylor is noted as appearing in Hogarth's print, but is described as being " placed in a gallery above the twelve physicians who crowded the foreground of the picture." To an ardent student of the science of heraldry this

could only be looked upon as blasphemy, for according to heraldry, Taylor is " the dexter figure on a chief, nebula, ermine." True, the " *nebula* " partition, under what is called the " chief " of a coat of arms, does in the print give one the impression of a gallery, but nothing in the nature of a gallery will appear to the eye of the trained reader of the signs and markings of heraldry.

Dr. Bennett again makes a curious construction of Hogarth's description which will be referred to later, and Haggard (4) is guilty also of a misinterpretation when in his description of the print he writes—" twelve cane heads, *or*, consultant," with a comma after cane heads and the ' OR ' printed in small letters as if a conjunction. " Twelve gold cane heads " is the actual interpretation of " twelve cane heads OR,"—OR being the heraldic name of gold. One notes moreover that even Garrison fails to appreciate Hogarth's endeavours to express in a heraldic print what he thought of the notorious medical characters of the time, for in Garrison's history of medicine, the description given would lead one to suppose that the " company of undertakers " is merely a portrait. As Garrison puts it " —except in caricature, the art of the 18th century throws little light upon the status of the medical profession. Reynolds and Gainsborough, Fragonard and Watteau are unusually reticent about medicine in their canvasses, although a few portraits of physicians were, of course, painted by Raeburn and others, with Sir Joshua's great portrait of John Hunter at the head of the list. Hogarth's ' Company of Undertakers ' (1736) with the legend, Et plurima mortis imago, represents twelve hard-featured individuals, all bewigged and armed with gold-headed canes, who are supposed to represent Spot Ward, the Chevalier Taylor, Madame Mapp (in a zany's coat of many colors), and other quacks of the period." Quite apart from the fact that Hogarth's humorous presentation in the form of a coat of arms is not commented upon, is the little detail of Garrison's statement that the print represents twelve hard-featured individuals instead of the fifteen present by actual count.

Without wishing to appear critical one notes again that Garrison has misread plate 3 in Hogarth's " Marriage a la mode " for certainly nothing in this plate would suggest the presentation of a figure described as a " poor syphilitic child." Whoever may be the writer who

described the plates in J. Dick's reproduction of the works of Hogarth, he seems inclined to give an interpretation of this plate utterly different from that of Garrison.

Leaving aside little errors and misinterpretations it is necessary to give some short description of the designs, symbols and wordings which one notes in connection with any coat of arms and which Hogarth has seen fit to introduce into his interesting engraving. Designs and symbols used in heraldry are interesting little details which were evolved from the necessity of being able to recognize the armour clad leader in the field, and were markings on the helmet, lambrequin (a cloth which protected the neck from heat and blows), on armour, or particularly on the warrior's shield, hence the shape of the coat of arms. An old habit of ornamenting the shield with fur of some animal, gave rise to the ermine or fur markings, and old armourial bearings were like a Joseph's coat, sable, ermine, gold, silver, perhaps as background, with splashings here and there of bars, chevrons, figures, etc., in red, blue, green or purple. To describe all such markings or bearings is not part of this short paper, to do so would take one too far into the history of heraldry which includes the invention of a dictionary of its own. For our purpose one may describe a coat of arms as representing a field or background on which are placed a variety of markings. Colours (tinctures as they are labelled in heraldry) furs, and metals, form this background or field. The various additional markings referred to, go by the name of charges or ordinaries.

As the centuries went on, the habit of stamping crests and armourial bearings on documents, wax, linen, stationery, etc. or of carving them on wood or stone, revealed to the economically inclined the necessity of being content with black and white markings. The regicides of Charles Ist's time are given credit for this "tricking" as the process was named, and at about the same time Italian printers introduced the method of indicating furs, colours, metals and various markings by certain arrangement of the black and white, and by the use of vertical, horizontal or diagonal lines.

An example of this method of reproduction can be put before the reader (Fig. 2), one that lends itself to this short paper by its extreme simplicity, for at a glance one familiar with the elements of

heraldry recognizes a " blue lion rampant " on a gold field, surmounted by what is called a blue chief, on which are placed three gold stars or mullets. In true heraldic diction one describes this coat of arms as " bearing OR, a lion rampant, azure. On a chief of the last, three mullets of the field." The interpretation given is based on the fact that the lower two thirds of the shield, which is called the field, is white with black dots upon it. This represents a gold background in " tricking." The lion is quite evidently rampant from his stand

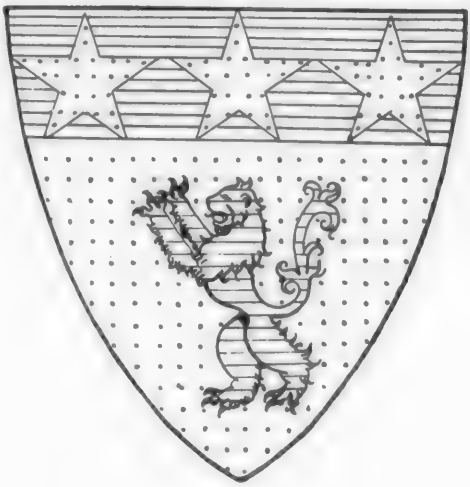

Fig. 2

and position, and because his body is crossed with horizontal lines he is supposed to be of blue colour. The upper third of the shield is distinctly marked off, making what is called a chief, and as it is marked in horizontal lines it must be looked upon as of blue colour also. The three stars or mullets again are white with black spots and are therefore supposed to represent a gold marking. The curious wordings " on a chief of the last " and " three mullets of the field " mean " a chief of the last mentioned colour, namely azure," while " mullets of the field " refer again to fact that they are " figures or charges " of the same colour as the field below, namely gold.

In interpreting a coat of arms, the colour, the metal, the fur of

the field usually begins the description; next comes the mentioning of the prominent markings or charges and finally a detailing of any dividing or partitioning lines. One such partition, the chief already referred to, occupies the upper third of the shield. Another, the fess, crosses the middle, bars or bends run from the right or left top diagonally across the shield. What is called the pale is indicated by vertical lines dividing the shield into two or three equal parts. Chequy or checkie is another well known surface marking on a shield and is represented by alternate black and white squares. The chief, the pale and checkie are all made use of in the " arms of the undertakers " and one sees as concerns the two latter markings that Hogarth has been able to bring into his print certain personal peculiarities which one might say lend themselves to a heraldic description. Other less prominent partition lines linear in design and often forming an edging of the larger markings, or being worked into them, are to be noted in many coats of arms, one such is the " nebula " which is made use of in Hogarth's print.

To merely mention the innumerable ordinaries or charges, a term which includes all markings, would consume an evening. The reading of the rules of heraldry would consume another. The details I have briefly described will enable us to follow Hogarth's description, for the " Arms of the company of undertakers " are on a shield of few distinct charges. Allowance must be made for wandering here and there from the straight heraldic path since certain opportune markings are too obvious not to be freely made use of.

To begin the interpretation one notes that " the arms of the undertakers " are contained within a black border, a hatchment, indicative of recent death; such hatchments were usually in evidence at funerals, or might be hung over the gates or doorways of a palace or castle. Placing the shield or the coat of arms on such a hatchment lets one realize how Hogarth must have felt towards the notorious practitioners of his day. On either side of the foot of the shield one sees the piratical cross bones. Objects in this position are called supporters. They may be looked upon as a distinct addition to the print and most appropriately chosen. One is familiar with these so-called supporters, as they are common additions to certain coats of arms, though perhaps most of us have not realized that the representation

of such animals as the lion and the unicorn on either side of the Royal coat of arms go by this name. They are not, however, a necessary part of any armourial bearing.

Approaching the shield itself, a departure from the general rules which govern the making of bearings in English heraldry must be noted. Save for the representation of Christ, the Virgin Mary, and an occasional saint or apostle, it is unusual to see a *human* figure in a coat of arms save in the position of a supporter. As one sees in " The Arms of the Company of Undertakers " the fifteen human figures are the most striking objects, and Hogarth has stepped far from what I have called the heraldic path in placing so many human figures in the field and chief of his design. A certain degree of license in this direction is, however, allowed by the colleges of heraldry in Scotland and on the continent, and no doubt Hogarth realized that he must make free use of this license if he were to be able to caricature properly the practice of medicine of his time. The three figures in the chief certainly make a real " trinity of iniquity " and it is interesting to know that their appearance together in public places of London has been frequently referred to.

Touching now upon the shield and its charges and following the rules of the so-called science of heraldry, we read or interpret the design of Hogarth's print thus—" The arms of the undertakers beareth sable," that is, has a black background or field, made up of crossed vertical and horizontal lines. Repeating as we go along we would say, " beareth sable, an urinal proper," the most important detail of the field as the engraver would have us look at it. The description " proper " indicates that in a black and white tricking the object being described is appearing really in its natural colouring. The urinal therefore was grayish or colourless and fits into the black and white tricking without further description or indication of its colour. It should be in the middle of the field, however, since it is the first object to be described.

" Between twelve quack heads and twelve cane heads," is self explanatory and satirical. Cane heads and quack heads are being bracketed equal in intelligence.

Twelve quack heads of the second—must be explained to those not heraldically inclined: a colour, a metal, a fur, once mentioned in the

description must not again be referred to by its own name. " Of the first, of the second, of the third, of the last " indicates a previous mentioning of a colour, fur or metal. " Sable " is fur or colour No. 1, and " urinal proper " is colour reference No. 2. Twelve quack heads reproduced in black and white, the natural colour of engraving, are, one might say, " twelve quack heads proper," but in place of proper already used in connection with the urinal, as the second named colour, one must, according to the rules of heraldry, describe the twelve quack heads as being of the " second "—named colour, therefore " of the second."

Twelve cane heads, (OR), means twelve cane heads of gold, represented in black and white tricking as a white background with small black dots. In a recent publication (Haggard) the author makes an error in having the description read " twelve cane heads or consultant," assuming " OR " to be a conjunction. Hogarth's satirical mind, as already suggested, ranks cane heads and quack heads again as equally gifted by making them meet as if in consultation, though " consultant " has no place in a dictionary of heraldry. However, as lions may be rampant, passant, couchant, etc., quack heads and cane heads gathered around a urinal may well be referred to as in " consultant " pose, if one prefers this interpretation to that which would suggest that " consultant " should be translated as " consulting."

This finishes the short description of what might be called the field. One notes that the upper third of the coat of arms is separated from the lower two thirds by something that looks like a waved top of the sable which constitutes the field. This is to be taken as representing the " nebula " marking and really belongs to the upper third, the chief, rather than to the lower two thirds. In the background one sees the characteristic ermine markings, so that the separated upper third of the shield can now be described as a " chief, *nebulae*, ermine." Whether it is intentional or not one cannot say, but the ermine markings show beneath them the horizontal lines which indicate a blue or azure colouring, something which is not at all in accordance with either the blazoned coats of arms or those represented by means of tricking.

Continuing one reads, " on a chief, nebulae, ermine, one compleat doctor issuant." " Issuant " here has its usual meaning, namely that

the figure is drawn as issuing or emerging from behind the nebula or cloud marking. Compleat, " one compleat doctor " was a description at first somewhat difficult to understand. The figure is certainly not complete, being actually a demi-figure or a demi body and a more accurate description of this central figure would really be " one demi man " or " demi doctor." One does not find the word " compleat " in any dictionary of heraldry, nor would one see the need of labelling a full sized human figure or animal figure as being " compleat." Nowhere in the many coats of arms in which the full figure of a man or animal appears is the adjective made use of, while on the other hand, particular attention is given to the description of various separated parts of the body. One sees with regard to heads, for instance, that if an animal's head is shown cut off immediately behind the ears, it is described as being " caboshed." If somewhat more of the head and neck are depicted, the head is said to be " erased." If a head and neck are shown the term " couped " is applied to the picture produced, while a figure showing head, neck and shoulder is considered a " demi figure." It is evident, therefore, that the massive half body of the central figure is described as " compleat " by Hogarth for some particular reason.

This reason was somewhat difficult to determine without the aid of glossaries or a concordance. A Shakespearian glossary gave one the necessary cue, for one sees in many of Shakespeare's plays that the word " compleat " is often used as meaning " resistant, solid or powerful." In " Measure For Measure," for instance, one finds the words " Believe not that the dribbling dart of love can pierce a compleat bosom " while again in " Richard III " one sees " May my curses tire thee more than all the compleat armour that thou wearest." The greatest attribute of Sally Mapp, " compleat doctor," was her terrific strength. It was said she could straighten a twisted spine by manual strength alone, and in many of the accounts of her prowess she is spoken of as " the man woman." I think one may assume that the wording " one compleat doctor " means a representative of the art, unusually gifted as to muscular power.

This " compleat doctor issuant " is also described as being checkie, since as one notes, part of her garments show the familiar checkie marking, a marking which we have already referred to as being in

regular use in heraldry. Cruickshank's picture of this Sally Mapps, the bone setter, depicts her in such garb, and her eccentricities in dress were well known to the inhabitants of London of her time. Hogarth for some reason prefers to consider this " compleat doctor issuant checkie " as a masculine character and one sees in the description the wording " sustaining in *his* right hand " and again " on *his* dexter and sinister sides." Sally Mapps was undoubtedly a very masculine character, possessed of enormous strength, but on the other hand there was never any doubt as to her sex.

Still interpreting one reads that the " compleat doctor " is sustaining in his right hand a " baton of the second." This " Baton " in the chief and upright is meaningless. A baton placed diagonally across the field is the mark of illegitimacy of bastardy, if it does not touch the edges of the shield. " Bar sinister " or " bend sinister " are terms quite wrongly used in this connection. The baton held in Sally Mapps' right hand is, as one sees, a bone, and something quite different from the fourteen cane heads which can be counted in the engraving. The baton is described as being a baton of the second, because here again it is something drawn in its natural colour, white, and as the urinal proper was the second colour description, and the baton is in turn drawn in its natural colour, it is referred to as " a baton of the second."

Continuing with the interpreting of Hogarth's description of his coat of arms, one finds—" on his dexter and sinister sides, two demi-doctors, issuant of the second." In a coat of arms one should remember that dexter and sinister, right and left are reversed: a human or animal figure facing us gives us of course at once the cue for right or left but Hogarth is still playing with heraldic terms. Chevalier Taylor, whose cane is shown with an eye, and whose right eye is closed with a wink, is the figure to the right. Bennett, for some reason, places the " eye-couchant," mentioned later, in the cane head, an obvious error as this eye is drawn wide open. Sally's neighbour to the left is the redoubtable Spot Ward, a worthy member of the well known trinity of quacks who flourished in London in the latter part of the eighteenth century.

The description " demi-doctors " is quite correct as concerns these two figures. In heraldry the upper half of an animal's body is fre-

quently represented: one sees " demi-lions, demi-horses, demi-dogs " in many coats of arms, so that the expression " demi-doctor " is here not far astray from the anatomical point of view. As concerns Taylor, moreover, we know that the term " demi-doctor " is no aspersion on his attainments, for charlatan that he was, he was a student of Cheselden and had acquired the medical degree of his times in England, and was given honorary degrees by many continental institutions. Ward was said to be in possession of a medical degree and it is stated that an act of Parliament precluded his being disciplined by the medical authorities.

The two demi-doctors are like the " compleat doctor," "issuant "—from behind the " *nebula* marking." They are described as being " of the second " because here again are objects on the shield appearing in the black and white reproduction in their natural colour. As explained above, these two figures might be spoken of as " two demi-doctors, issuant, proper " but one remembers that " urinal proper " is mentioned earlier in the description as the second element in the colour scheme. The demi-doctors therefore in the natural black and white of engraving are " of the second." The concluding words of this sentence " and two cane heads issuant of the third " can perhaps now be better understood. The two canes are issuing from behind the *nebula*. They are, from their marking, gold-headed canes, and as gold was the third mentioned colour or metal marking in the early part of the description, the two cane heads held respectively by Chevalier Taylor and Spot Ward, must be described as cane heads " issuant of the third."

Finishing the description and interpretation of the " Arms of the Company of Undertakers " we read, as concerns the figure to the right of " Sally " that he has " one eye couchant towards the dexter side of the escocheon." A very evident winking performed by one who well knew the value of the goods he was unloading upon an ignorant and trusting set of buyers. Unlike Sally Mapps and Ward, Taylor's face and figure lend themselves to neither caricature nor heraldic markings, and Hogarth merely presents Taylor with his knowing wink, and the eye in the cane head, to emphasize the fact that in ophthalmology this particular quack had made his greatest killing.

Quite different in their fullness are the references to the character on the left—" Spot Ward." " Faced per pale proper and gules guardent " has the true heraldic ring though the word proper cannot really be applied to " per pale " which is really part of the scheme of division, not a colour, fur or metal. It is probable that Hogarth is here describing a birth mark as making a natural division of Ward's face. A large disfiguring birth mark on the left side of his face was responsible for Ward's being known in London as " Spot Ward." Hogarth has drawn the mark to cover half the face. The vertical division into halves constitutes the " per pale " marking in heraldry. Since such birth marks are often red, that side of Ward's face which bears the blemish is filled in with vertical lines which in the black and white tricking indicates red. Red in heraldry goes by the name of " gules." " Per pale proper " and " gules " reduced to simple language means that the face has been divided into equal halves and that the shaded side bears a red stain or port wine mark. " Guardent " is an old heraldic expression which implies that the face of the animal or human figure is looking straight out from the picture.

In my own print one sees a small footnote, probably by Hogarth himself, which states that " A chief betokeneth a Senatour or Honourable Personage, borrowed from the Greeks, and is a Word signifying a Head: and as the Head is the Chief Part in a Man, so the chief in the Escocheon should be a Reward of such only whose High Merits have procured them Chief Place, Esteem, or Love amongst Men. (Guillim.) The bearing of Clouds in Armes (saith Upton) doth import some Excellence."

Two small details of the picture are passed by by Hogarth without description. Towards the left of the nebula marking one sees a shaded round area in the sable which goes by the name of a " roundle." These roundles of which there were many patterns are a common ornament on many coats of arms. If the roundle in Hogarth's print appeared as white with black dots or as plain white, one would say that it was meant to represent a gold or silver Byzantine coin—a " Byzantin." The association of gold and silver with the quacks of the time and their extortionate methods would be quite proper. The markings of the roundle in the print seem to label it as a so-called " pellett or ogress," and I can see no particular association

of this type of roundle with the figures in the picture, unless it is meant to represent an unusually large pill. This, however, is pure assumption.

To the immediate right of Chevalier Taylor one sees again something of which no note is made, namely a cross hatching which from its particular pattern, horizontal lines, crossed by the diagonals from right to left, means that it is an old colour marking called " tenne." Tenne means orange, and here again one finds it difficult to know what this particular colouration should stand for. One might suggest that it is the orange glare of publicity coming in upon the three notorious characters in the chief, but to stick to facts—I have been unable to get any suggestion as to what this curious unfinished looking corner of the shield may represent, unless perhaps " the bearing of clouds in arms," is being stressed.

The final touch in connection with the " Arms of the Company of Undertakers " is the motto, " Et plurima mortis imago—And the manifold image of death." Whether this is a quotation or is something which indicates Hogarth's own conception of the picture I cannot say. It serves again, however, to show just how degraded the medical profession of the times had appeared to a shrewd and practical observer.

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Heraldry by A. C. Fox-Davies has been freely referred to in interpreting " The Arms of the Company of Undertakers."

THE EAGLE STONE, AN ANTIQUE OBSTETRICAL AMULET

T. G. H. DRAKE*

In a collection of antique amulets obtained in England, there was included the brownish stone shown in the illustration. The specimen is mounted in a 17th century silver mount bearing loops for suspension. To the specimen is attached a label describing it in early 18th century script, as " Aetites, an eagle stone found in Ireland, supposed to possess amuletic virtues." On the reverse side of the ticket is pasted a card on which is written by another hand, in ink which has become greatly oxidized, " Aetites or Eagle Stone—supposed to be obtained from the nest of the King of Birds and to possess the property of assisting women in childbirth." At the time of acquisition, the stone was filed away without further examination among a series of minerals of amuletic interest. However, one evening while reading T. J. Pettigrew, " On superstitions connected with the history and practice of Medicine," London, 1844, the following passage was encountered, " To promote or facilitate delivery, the lapis aetites, or eagle stone, a composition of the oxyde of iron with small portions of silex and alumina, which rattle within upon being shook, have been bound to the arm or to the thigh, the former to prevent abortion, the latter to aid in parturition." I am happy to report that in my rush downstairs to examine my specimen, no limbs were broken, and that when the stone was shaken, it rattled very satisfactorily.

A search of the literature revealed further references to the eagle stone in Pliny, Culpepper, and Wallis Budge. In " Plinies Naturall Historie," translated by Holland, 2nd Edition, London, 1635, the following three references are found.

Tome 1, Book X, chapter 3, page 272, " But of the six kinds (of eagles) before rehearsed, the 3 first and the fifth have in their nest a

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stone found named Aetites, which some call Gagates, and it is therein engendered. This stone is medicinable, and singular good for many diseases, and if it be put into the fire it will never a whit consume. Now this stone, as they say, is also with child; for if a man shake it, he shall heare another to rattle and sound within, as it were in the belly or wombe of it. But that vertue medicinable abovesaid is not in these stones, if they be not stollen out of the very nest from the airie."

Eagle Stone, an Antique Obstetrical Amulet.

Tome 2, Book 30, chapter XIV, page 396, " The aegle stone called Aetites because it is found in an Aegle's nest preserveth and holdeth the infant still in the mothers womb to the ful time, against any indirect practise of sorcery or otherwise, to the contrary."

Tome 2, Book 36, chapter XXI, page 590, " The aegle stones called Aetites be much renowned in regard of the very name they carry; found they are in aegles nests, as I have shewed already in my tenth book, and it is said they be two together, to wit, the male and female; also without them, the aegles cannot hatch, which is the reason that they never have but two young aegles at one airie. Of this aegle-stone there be foure kinds; for one sort thereof is bred

in Africke, and is very small and soft, containing within it as it were in a wombe a certaine clay which is sweet, pleasant and white; the stone it selfe is brittle and apt to crumble, and this is thought to be the female sex. The second, which is taketh for the male, groweth in Arabia, hard this is, and resembleth a gall-nut in fashion, and the same otherwhile is of a reddish colour having inclosed within the belly thereof another hard stone. The third is found in the Island of Cyprus, for colour much like to those that be engendered in Africke, otherwise bigger and made more flat and broad than they; the rest be usually round in manner of a globe. This hath also within the wombe a sweet sand and other small gravelly stones, but it selfe is so tender that a man may crumble it betwixt his fingers. The fourth kind is named Taphiusius, for that it is bred neere unto the Cape Leucas in a place neere Taphiusa, on the right hand as men saile from the said Taphiusa toward Leucas; there is found of it in rivers, but the same is white and round; within the belly of it there is another stone called Callimus, and there is not a stone more tender than it. But to come to the properties of these Aegle-stones; They are recommended as singular for women with childe, ore four footed beasts that are with yong; for being hung about their necks or otherwise tied onto any part within in the skin of a beast sacrificed, they will cause them to go out their full time, but removed they must not be but at the very time of deliverance for otherwise the very wombe or matrice would slip out withall; and unless they be removed then, they shall never be delivered."

The amulet illustrated, a reddish brown, shaley limestone, from its colour and hardness might be fitted into Pliny's second group. The form of the inclusions could not be determined since the stone is evenly opaque to the x-rays.

Nicholas Culpepper, Gent., student in Physick and Astrology, in a "Directory for Midwives," 1737 edition, page 99, follows Pliny's classification of the Lapis Aetites, "by some called Lapis Praegnans, or a stone with child." He agrees that stones have sex, although, "some (and they no small fools neither) think there is no sex in stones."

Culpepper writes that he is informed that there are many eagle stones now to be had in London, some varieties more efficacious than

others, " But as in some things the best is bad; so in this, the worst is very good." Culpepper's directions for the use of the amulet are the following.

(Page 99) " For its use: This Stone being hung about the neck of a woman with child, so that it touch the skin, preserves the child in her body, till the time of her delivery come: Experience shall prove my words to be very true."

(Page 106) " Of a woman labouring with a dead child, signs of the fruit of the womb being dead are .....(9). When she turns herself in her bed, or riseth up, the fruit of her womb sways that way (if it be not a solecism to call a dead child fruit) like a lump of lead; and indeed if the child be anything displaced, it will do so; yet if Tansie be but applied to her navel, or the stone Aetites, it will remedy if the child be alive; but not so if dead."

(Page 107) " If you be confident your child be dead in your womb; do thus .....(5). The stone Aetites held near the privities, draws away the child, for its magnetick vertue is such that it draws the child any way as readily as the load-stone draws iron."

(Page 110) " What makes the birth easy .....(6). The stone Aetites; held to the privities instantly draws away both child and after—burden; yea, draws out womb and all, if you remove it not instantly after they are come away, for its magnetic vertue is such if you do any mischief that way, the fault is not mine, you are forewarned of it; for such is the vertue that both child and womb follow it as readily as iron doth the load-stone, or the load-stone the North Star."

(Page 118) " What brings away the after birth. (4) Remember Tansie, and the stone Aetites."

(Page 292) " To preserve from abortion: Let her hold a load-stone in her hand, or tie it to her navel, or wear an Eagle Stone under her arm-pits."

If as a result of malpractice in the use of the eagle stone evulsion of the uterus occurred, it is quite probable that the 18th century mid-wife would have attempted to replace the womb by, " frighting it in, by putting a red hot iron before it and making a show as if you intended to burn it."

A recent reference to the use of the eagle stone and its value in conditions other than obstetrical is found in Sharper Knowlson, "Origins of popular superstitions," quoted by Wallis Budge, "Amulets and Superstitions," London, 1930, page XXXV, "Mr. J. D. Rockefeller, a Nonconformist, has for years carried in his pocket an 'eagle stone' in a hollow in which there are concretions which rattle when the stone is shaken. He regarded it as a charm against disease, shipwreck, and other calamities."

MASTER DOCTOR CAIUS

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Most physicians in Elizabethan drama are either conventional travesties of their profession, like the truculent doctors in *Monsieur Thomas*,[1] or else, like Lecure [2] and Eudemus,[3] are utter villains; but Shakespeare neither caricatures nor vilifies his doctors: Cerimon in *Pericles*, Cornelius in *Cymbeline*, and the physician in *King Lear* are honest and skillful, and the two doctors in *Macbeth* are dignified and realistically portrayed. In *Merry Wives of Windsor*, therefore, Doctor Caius, who has the most extensive medical role in all the plays, should have an equal degree of realism and of dignity. From the eighteenth century onward, however, those critics who have not ignored him entirely have generally dismissed him with a word, as "impertinent," [4] "outlandish," [5] or "ridiculous," [6] or have vaguely dubbed him a "well-known" [7] or a "comic" [8] type. Amid such general disregard and casual disagreement,[9] the Doctor Caius that Shakespeare showed his audience is yet to be defined. Shakespeare could draw an Elizabethan figure only in terms of Elizabethan social usage and of Elizabethan psychology; and any proper interpretation of his contemporary characters must, therefore, depend on the social mores and psycho-medical beliefs of his audience. Elizabethan popular psychology and medicine presupposed that the four bodily "humors," blood, bile, phlegm, and black bile, controlled the physical and mental states of the individual, and that a preponderance of any one humor produced a corresponding extreme of tempera-

[1] Beaumont and Fletcher, *Monsieur Thomas*, II, v and III, v.
[2] Beaumont and Fletcher, *Thierry and Theodoret*, II, i; III, iii; IV, ii.
[3] Ben Jonson, *Sejanus*, III, i.
[4] Shakespeare, *Works*, ed. Rowe, London, 1710. vol. 7, p. 288.
[5] *Merry Wives*, ed. Johnson and Steevens, London, 1785, p. 276.
[6] Johnson's note in *Merry Wives*, ed. Malone, London, 1790, p. 309.
[7] F. W. Clarke in *Merry Wives*, ed. F. J. Furnivall, N. Y., 1908, p. xii.
[8] B. S. Matheson, *Invented Personages in Shakespeare's Plays*, U. of Pennsylvania Doctorate Dissertation, 1932, p. 33.
[9] Furnivall concedes Caius' "individuality," but fails to elaborate: see *Leopold Shakespeare*, London, 1877, p. lii.

ment: an excess of blood made one sanguine, of phlegm phlegmatic, of bile choleric, or of black bile melancholic; but a nice balance of humors produced mental and physical health. Each humor and its concomitant complection, furthermore, was associated with definite astral influences, with specific occupations and professions, and with infinite minutiae of personal traits. Measured by these concepts, Doctor Caius is indeed a "type"—not a dramatic convention, but a psycho-medical type with a well-recognized social position. As such must he be examined, in his professional and his national aspects and in his personal temperament.

Despite their attacks on medical quackery, the Elizabethans respected the legitimate physician.[10] The doctor not only outranked "his two chief attendants,"[11] the apothecary and the surgeon, but also enjoyed considerable social prestige and economic independence: the physician's fee seems to have been one angel a visit, and he frequently gained more than a competence;[12] the learned Doctor John Caius, attendant to three Tudor monarchs including Queen Elizabeth, was a munificent benefactor and co-founder of the college that bears his name;[13] and Sir William Paddy[14] and Sir Theodore Mayerne,[15] physicians to James I, were knighted for their services, and grew sufficiently affluent to leave handsome bequests. Any London or court physician had to be a university graduate and a "licensiate" of the College of Physicians.[16] Shakespeare's Caius, therefore, whose court practice is repeatedly affirmed, should be, and is, professionally and socially a significant person: as a doctor, he is "renowned;"[17] the nature of his practice is revealed when he gratefully promises the Host of the Garter the patronage of "de earl, de knight, de lords, de

[10] Macleod Yearsley, *Doctors in Elizabethan Drama*, London, 1933, p. 25 *et passim*. J. C. Bucknill, *Medical Knowledge of Shakespeare*, London, 1860, pp. 1-55. Nicholas Breton, *Works*, ed. A. B. Grosart, Edinburgh, 1875, vol. I, "Goode and the Badde," p. 9.

[11] Breton, *loc. cit.*

[12] *Shakespeare's England*, Oxford, 1926, vol. I, p. 534.

[13] *DNB*, vol. 8, p. 222.

[14] *DNB*, vol. 43, p. 35b, records bequests to St. John's College, Oxford, of an organ, 2,800 £, and many books.

[15] *DNB*, vol. 37, p. 152a, mentions his bequest of 200 £ to the Hospital of Geneva.

[16] *Shakespeare's England*, vol. I, p. 416.

[17] *Merry Wives*, ed. W. Aldis Wright, N. Y., 1902, III, i, 56.

gentlemen, my patients;" [18] he maintains a household of his own, and has two servants to run it; and he is so "well money'd" [19] that Mistress Page prefers him as a match for Anne to the "well landed" [20] Slender with his three hundred pounds a year.[21] As a university graduate, he is a gentleman of sorts; and Sir Hugh Evans, a knight and a gentleman, accepts his challenge.[22] Thus, Caius measures up socially to the dignity of his professional standing. In the fixed class-system of Elizabethan society, profession and caste quite overshadowed personal identity; and even a man's humor and consequent mental and bodily state were expected to conform to his status and occupation: a doctor was properly under the astral influence of the planet Mars; the humor dominant in his body was bile; and his temperament should be choleric.[23]

Caius appears not only as a doctor but likewise as a Frenchman: he is repeatedly identified as French; and he speaks his hundred-fourteen lines in a consistent French-English dialect. Although much of the comedy of Caius' role depends on his broken English, he does not, thereby, become a mere dramatic convention: he is not the first French dialectic character in Elizabethan drama, but, of the few indistinct figures that precede him, two merely assume a dialect as part of a brief disguise,[24] and all speak either a hopeless lingo or a synthetic jargon only slightly changed from normal English and garnished with French words.[25] Such crude and meager antecedents hardly constitute a tradition, and, if the dialectic Frenchman was later conventionalized, Caius started rather than followed the vogue. Thus, on the English stage, Shakespeare would seem to be the originator of authentic French dialect; and Caius, the Frenchman, becomes a realistic figure, whose truth to life tempers his comic quality. His dialect, though amusing, does not make him ridiculous: the Host,

[18] *Ibid.*, II, iii, 83-4.
[19] *Ibid.*, IV, iv, 87.
[20] *Ibid.*, IV, iv, 85.
[21] *Ibid.*, III, iv, 33.
[22] *Ibid.*, III, i, 1 *et passim.*
[23] C. Dariot, *Iudgement of the Starres*, tr. Wither, London, 1598, D3.
[24] Barabas in *Jew of Malta*, IV, vi, 30 *et passim.* Fraud in *Three Lords and Three Ladies of London.*
[25] See roles of French soldiers in *Famous Victories of Henry Fifth*; of Pedro in Lodge's *Wounds of Civil War*; and of Jacques in Greene's *Scottish History of James IV*. Cf. also Wilson O. Clough, "Broken English of Foreign Characters of the Elizabethan Stage," *PQ*, vol. 12, fac. p. 255.

to be sure, makes sport of the Doctor by misleading him in the use of English words,[26] but this is only slightly broader comedy than the language lesson of Queen Katharine and the Lady Alice in *Henry V*.[27] In his actions and his attitudes, Caius the Frenchman should reflect the humor and complection proper to the Gallic temperament. Frenchmen are southerners, and men from warm climates had the "hot and dry"[28] temperature that fitted the choleric humor; Farrand says that they love "with impatience and rage;"[29] and Varchi explains that "choleric men are given to jealousy,"[30] and that in "southern countries, men are very jealous."[31] Caius' love for Anne Page, therefore, and his jealous rage and the challenge, when Evans interferes in the affair, are the natural consequences of his nationality and of his humor; and his disapproving comment on Master Ford's jealousy that "'tis no the fashion in France; it is not jealous in France,"[32] is the cue for uproarious laughter.

Thus, not only as a doctor, but also as a Frenchman, Caius should be afflicted with an excess of bile, and should, therefore, display the characteristic traits and behavior of the choleric man; and, indeed, the Host of the Garter tells him to "throw cold water on his choler."[33] Mistress Quickly, to be sure, calls him "phlegmatic"[34] and "melancholy;"[35] but Shakespeare is obviously using her ignorance for comic effect, as he does when she speaks of Anne Page's "allicholy."[36] The choleric man was habitually angry[37] and given to "rayling,"[38] "chyding,"[39] and "quarreling;"[40] Caius, in his very

[26] *Merry Wives*, ed. Wright, II, iii, 51 *et passim*.
[27] *Henry V*, ed. Wright, III, iv.
[28] T. Elyot, *Castel of Helth*, London, 1541, leaf 70. B. Varchi, *Blason of Jealousie*, tr. R. Tofte, p. 29. J. Ferrand, *Erotomavia*, Oxford, 1640, pp. 88-93. W. Vaughan, *Directions for Health*, London, 1633 (7th ed.), p. 28. C. Dariot, *op. cit.*, C4 verso.
[29] *Op. cit.*, p. 90.
[30] *Op. cit.*, p. 29.
[31] *Ibid.*, 21-2.
[32] *Merry Wives*, ed. Wright, III, iii, 151-2.
[33] *Ibid.*, II, iii, 77-8.
[34] *Ibid.*, I, iv, 68.
[35] *Ibid.*, I, iv, 83.
[36] *Ibid.*, I, iv, 138.
[37] T. Walkington, *Optick Glasse of Humors*, London, [1631?], p. 103. See also Breton, *op. cit.*, "Dialogue betweene Anger and Patience," p. 61.
[38] L. Lemnie, *Touchstone of Complexions*, tr. Newton, London, 1576, leaf 23 verso.
[39] *Ibid.*, 23 verso.
[40] *Ibid.*, 23 verso.

first scene,[41] swears incessantly "by gar" and "ma foi," rails at Rugby, threatens the unfortunate Simple, scolds Quickly for her singing, and challenges Evans to a duel. The play, throughout, shows his "pride in honor," [42] his "arrogance," [43] and his "contempt of others." [44] He is given less to "reason" than to action; [45] and, although his duel with Evans, like every formal duello in Shakespeare, ends in farce,[46] yet, he is sincerely bent on "fighting," [47] as the choleric man should be.

Caius, though choleric, is not, like so many of that humor, particularly vicious or dangerous: [48] he releases Simple unharmed; [49] he is reconciled with Evans when the innkeeper's hoax is revealed; [50] and he has forgotten his anger when he warns the Host of the Garter against the spurious Duke de Jamany.[51] Elizabethan writers recognized two or three varieties of choleric disposition: Vaughan mentions two, the "open" and the "hidden," [52] the latter the more dangerous; Coeffeteau and Downame, following Aristotle, add a third "violent" [53] variety which is "especially bad and dangerous," [54] and is satisfied only by "revenge." [55] The Doctor's choler is of the first and least virulent kind, "sudden and accute and soon over," [56] a humor calculated to comedy rather than deep tragedy; through it, Shakespeare gave Caius perfect verisimilitude, and at the same time created a personality fitted to the comic purpose of his play.

[41] *Merry Wives*, ed. Wright, I, iv, 38 *et passim*.
[42] P. de la Primaudaye, *French Academy*, London, 1613, pp. 313-4.
[43] Downame, *op. cit.*, leaves 25 and 26.
[44] Coeffeteau, *op. cit.*, pp. 568-76.
[45] De la Primaudaye, *op. cit.*, p. 313.
[46] A. S. Wilson, "The Duello in Shakespeare's Plays," *Anglia*, about to appear.
[47] *Merry Wives*, ed. Wright, III, i, 72-85. Elyot, *op. cit.*, 8 verso and 9 recto. Dariot, *op. cit.*, sig. D3.
[48] J. W. Draper, "The Choleric Cassio," *Bulletin of the History of Medicine*, June, 1939.
[49] *Merry Wives*, ed. Wright, I, iv, 80 *et passim*.
[50] *Ibid.*, III, i, 106 *et passim*.
[51] *Ibid.*, IV, v, 81-2.
[52] Vaughan, *op. cit.*, p. 136.
[53] Coeffeteau, *op. cit.*, p. 571.
[54] Downame, *op. cit.*, leaf 36.
[55] *Ibid*, 39 verso. Coeffeteau, *op. cit.*, p. 573.
[56] Coeffeteau, *op. cit.*, pp. 571-2.

Although Caius' role in this romping comedy of manners [87] is largely comic, to the Elizabethan audience he was more than a mere funny man; both as a doctor and as a Frenchman, his choleric humor dictates his conduct and his speech; his temperamental outbursts, his amorous mood, and his jealousy, all are the natural concomitants of this dominant humor; and his dialect, though uniformly amusing, is too regular and realistic to make him ridiculous. Caius, after all, is a personality: he is a fiery little fellow, proud and easily aroused but quickly pacified; and, with all his belligerence, he is courageous and sincere, for he will fight for Mistress Anne; and when he is bilked at the last, although the audience laughs, it is the laughter of sympathy rather than of scorn.

[87] E. J. Haller, "Realism of the Merry Wives," *West Virginia University Studies*, III, May, 1937, pp. 32-8.

DOCTOR CHEADLE IN WESTERN CANADA *
1862–1863

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" The pluck that made them conceive, and the vastly greater pluck that enabled them to pull through such an expedition was of the truest British kind. Had they but known it, they were beaten as completely as by the rules of war the British troops were at Waterloo. They should have submitted to the inevitable and starved. But luckily for themselves, and for their readers, they did not know it; and thanks to Mrs. Assiniboine and their own intelligent hardihood that kept them from giving in, they succeeded where by all the laws of probabilities they ought to have disastrously failed."

With these words, George M. Grant in his " Ocean to Ocean," the story of an expedition through the same territory nine years after Milton and Cheadle's trip, paid tribute to those two who were the first to make the trans-Canada tour merely for the sake of adventure. The trail had been blazed for them by explorers, Alexander Mackenzie in 1793, David Thompson and Simon Fraser, by fur-traders such as Dr. John McLoughlin, Alexander Henry the younger and Sir George Simpson, by the missionary Father DeSmet, by the artist Paul Kane, by the expedition of Captain John Palliser in 1857 with Dr. James Hector as geologist and cartographer, and still more recently by party of Canadians of 1862 on their way to the Cariboo district. With all these, however, the ultimate goal was what mattered and the country traversed was only incidental, but Milton and Cheadle were fired with a desire to see a land which in that day was as little known to the polite world as are the wastes of Antarctica today.

The proceedings of the Select Committee of the British House of Commons " appointed to consider the state of those British possessions in North America which are under the administration of the

* Read before the Section on Historical Medicine in McGill Medical Library at the Annual Meeting of the Canadian Medical Association at Montreal, June, 1939.

Hudson's Bay Company," and the report of the Palliser expedition sent out by the British Government focused the attention of the British public on that territory, and the discovery of gold in the Cariboo district in 1857 heightened the interest. Another lure of the great lone land for youth was the sport of buffalo running. For sheer excitement it compared with English fox hunting as a championship fight does with shadow boxing. Lord Milton had had a " pop at the buffalo " in 1860 and was eager to repeat the experience. For his second trip he invited Walter Butler Cheadle, who had just gained a medical degree, to accompany him, and as a friend of long standing Cheadle accepted.

Viscount Milton was the only son and heir of the 6th Earl Fitzwilliam and of Lady Frances Douglas, daughter of the Earl of Morton. At the beginning of the trip he was barely twenty-three years of age, and Cheadle was about four years his senior. Lord Milton suffered from a malady, possibly epilepsy, which may have contributed to his early death before succeeding to the earldom, and a medical companion would therefore be most desirable on such a journey. Cheadle was the son of a clergyman, and had been educated at Bingley, Yorkshire, and at Cambridge where he had gained a reputation for absolute straightforwardness, high abilities and athletic prowess. But for a serious illness in his family, he would have rowed in the Cambridge boat against Oxford in 1859. This was the year when the Cambridge boat capsized and Cheadle was wont to say that had he taken his place in the boat, this disaster might not have occurred as his great bulk would have kept Cambridge from using a very light shell.

The story of Milton and Cheadle's journey was first given to the world in " The North West Passage by Land " which appeared in 1865 under their joint names but was undoubtedly the work of Cheadle. The ninth and final edition came out in 1901. A more intimate and revealing account is to be found in " Dr. Cheadle's Journal of a Trip across Canada 1862-63," which was not published till 1931. Cheadle's manuscript journal was the source of " The North-West Passage by Land." It makes no pretence of literary style but bears the indelible stamp of sincerity.

On the nineteenth day of June, 1862, the two young men embarked

at Liverpool on the Montreal Ocean Steamship Company's *Anglo-Saxon*, bound for Quebec. There was little out of the ordinary until they reached Georgetown, Minnesota, where they heard that a war party of Sioux Indians had been sighted nearby. Had their departure been long delayed they might have been victims of the terrible Sioux massacre. As the Red river was low, and the trips of the river steamer *International* uncertain, they purchased two canoes and on July 20 Milton set out in one with Cheadle and Messiter, an Oxford man, in the other. Being quite inexperienced in the ways of the country, they suffered much from heat, thunder storms and mosquitoes so that when, on August 5 they heard the whistle of the *International*, they were eager to embark. Two days later they reached Fort Garry which Cheadle described as " good stone wall enclosure flanked by round towers; port holes glazed; offices, store and governor's house inside." La Ronde, Milton's guide on the previous trip, boarded the steamer on its arrival and the two young men decided to camp near his house.

During the next two weeks spent in purchasing supplies and selecting horses for buffalo running, Cheadle found time to call on Governor McTavish, Bishop Anderson at Bishop's Court, " a little square white house well furnished, untidy garden like the others," and to meet Archdeacon Hunter, Mr. Bannatyne, the merchant, Mr. Pruden, a retired H. B. chief factor, and Dr. Bird. On August 20, Bishop Anderson and his sister entertained at dinner Milton, Cheadle, Messiter, Judge Black, Lord Dunmore of the Guards with his party from Montreal, Col. and Capt. Cowper and Captain Thynne who had come to shoot buffalo and grizzly bear in the Saskatchewan country.

On August 23 at 4 p. m. Milton, Cheadle and Messiter with La Ronde, Vital, Voudrie and Bruneau set out from Fort Garry in high spirits. They went nine miles to Sturgeon Creek and camped there. Cheadle was called to see Mr. John Rowand, retired Hudson's Bay officer, who had albuminuric anasarca. At White Horse Plain, two nights later Milton and Cheadle were invited to a wedding where Milton danced the Red River jig with the pretty pensive-looking bride. Throughout the remainder of his Journal, Cheadle continued to make medical observations. He noted the frequency of goitre

amongst the dwellers on the banks of the Saskatchewan; he vaccinated all those unprotected against smallpox at Fort Carlton; he prescribed for a four-year old child with hydrocephalus; and for a big-bellied Saulteaux child who had worms; he had anxious days and nights over Milton's symptoms; at Fort Edmonton he found three women and six children suffering from secondary syphilis; he treated Mr. Christie's little girl who had remittent fever; and at the Cariboo gold field he was asked to see a poor fellow nearly dying of cardiac dropsy.

The route travelled was the well-known cart-trail from Fort Garry to Fort Edmonton. On August 29 they left Portage la Prairie and the last of houses for many a long day. Six days later they reached Fort Ellice on the Assiniboine and were hospitably received by the Post Master William MacKay. There Milton bought an Indian lodge which proved very comfortable a few nights later. The shooting was good, larded prairie fowl to supper were voted excellent and Cheadle admired the autumn tints. On September 18 they reached Touchwood Hills and one week later they crossed the South Saskatchewan, eighty yards wide, in the Company's barge. On the next day they came to Fort Carlton on the south bank of the North Saskatchewan. Here they were received by Mr. Lillie in charge of the Fort who treated them to fresh buffalo steaks. On Sept. 29 they rode out with a party to track down two enormous grizzly bears which Peter, the interpreter, had seen the previous day five miles from the fort. The bear tracks were larger than a man's foot, but no sight was caught of the animals themselves. Two days later Cheadle had the thrill of the buffalo hunt. "I felt highly elated at having succeeded in slaying my first buffalo," he wrote, "and had been highly excited during the run, screaming and shouting, etc., like a madman." For four days they ran buffalo, then returned to the fort where Milton and Cheadle parted company with Messiter.

On October 10 Milton and Cheadle crossed the North Saskatchewan and travelled about forty miles north and a little west to La Jolie Prairie, a spot which Professor Morton of Saskatchewan has located in Indian Reserve No. 104, Mistawasis. The beauty of this prairie surrounded by woods and small hills with one or two lakes in the opening caused them to select it as the site for their winter

home. Ten days later they laid the first logs of their house, 15 by 13 feet. The completed house was six feet in height, but by digging out the floor two feet they had sufficient head room and the house was much warmer. The first chimney was built on October 27, but, when a fire was kindled, part of it fell down. Next day Cheadle rebuilt it with a larger foundation of stones and clay, and this time it stood fast.

During the winter Cheadle, under the guidance of La Ronde, learned to make and set traps but met with provoking misfortune. He notes in his Journal: "I found all traps broken and the remnants of one marten. The wolverine again. Eaten of the Yankee strychnine and made him hungry! La Ronde thinks him half devil."

On April 3, 1863, Milton and Cheadle left their winter quarters for Fort Carlton. There they engaged Baptiste Supernat at £12 per month as guide in crossing the mountains and said good-bye to La Ronde who returned to Fort Garry. On April 9, they set out for Fort Pitt and reached it on April 20. Here Cheadle was called to see the Assiniboine's child who was very ill and who died two days later. The loss of their younger child left the parents loath to stay on at Fort Pitt, and they begged Cheadle to allow them to go with him. The Assiniboine had been christened Louis Battenotte but he was commonly called the Assiniboine from having been brought up in childhood by that tribe. He was a middle-sized yet athletic man of very Indian appearance. His manner was mild and pleasing and his voice singularly soft and melodious, yet when angry or excited his aspect would become perfectly fiendish and his voice like the roar of a lion. He had killed a half-breed in a drunken squabble and had been excommunicated, but the slain man was a notorious bully and there was excessive provocation. His seductive manners charmed Milton and Cheadle and though they did not relish the addition of the Assiniboine's wife and thirteen year old son, yet they consented and had no cause to regret their decision.

At Fort Pitt they bought more horses and set off westward ho! after a week's stay. On May 8 Baptiste and the Assiniboine showed them how to make a buffalo-hide canoe in order to cross a river. On May 14 they reached Fort Edmonton, "very prettily situated," wrote Cheadle, "on a high cliff above the river, banks

well wooded." Here they were kindly received by the officer in charge, Mr. Hardisty, and met the famous missionary to the Blackfeet, Father Lacombe, who arranged a hunt for grizzly bears. Like the Carlton hunt, this, too, was unsuccessful. They also made the acquaintance of Mr. O'Byrne, " a man of 60, clothed in a long coat and walking with a huge stick." He too wished to join the party, and intimated that it would be to their advantage to take him with them, though Cheadle considered him the most helpless fellow in the world. Ten days later, Cheadle wrote in his Journal: " Yesterday we made Mr. O'Byrne happy by consenting to take him with us; he made a most pathetic appeal to me as a Cambridge man, and although we knew it was foolish to burden ourselves with an extra mouth, yet we could not find the heart to refuse him." Two days after the party had left Edmonton, Cheadle's first estimate was confirmed. O'Byrne was utterly useless, unwilling to help, an arrant coward, obsequious to the young nobleman but arrogant to the men.

On June 17 they crossed the McLeod river and got into difficult country. Three days later, they met their first disaster. Milton and Baptiste had quarrelled the previous day and next morning Baptiste disappeared taking with him one of the best horses. The Assiniboine was made guide at the same wage, though he had the handicap of a maimed left hand, all but two fingers having been shot off by a gun explosion. On June 24 they reached the Athabaska river, ⅛ mile broad and full to the banks. Here Cheadle had his first view of the Rocky mountains. The Athabaska trail proved extremely trying and O'Byrne's conduct was exasperating to a degree. Instead of helping to unpack even his own horse when a camp site was reached, he would wander off to smoke his pipe and read Paley's " Evidences of Christianity." The Assiniboine became infuriated with him one day, and Cheadle was obliged to reprimand the guide and remonstrate with O'Byrne who countered with tags of Latin. On July 5 they crossed the Athabaska on a raft, then pressed on to the Fraser valley, reaching the Grand Fork of the Fraser on July 14, " certainly," wrote Cheadle, " the finest scene I have ever viewed."

Disaster struck again the next day. In tracking along the Fraser, two of the pack horses were swept down stream by the current. By desperate efforts the Assiniboine succeeded in bringing Bucephalus,

Cheadle's horse, to shore, but the other, Giskaquarn, the "Fool," which carried their personal effects, was true to his name and would not be rescued. On the very next day another horse was nearly lost in a quagmire, through O'Byrne's failure to help the Assiniboine's wife. On July 21, they built a raft to cross one of the roaring mountain torrents. The raft got out of control and was swept under a pine overhanging the stream. Milton and Mrs. Assiniboine clung to the branches of the pine from which they were rescued only with the greatest of difficulty. The raft was retrieved lower down the river but they lost their matches and Milton's fire-bag, so that the only flint and steel they had left was the Assiniboine's.

On July 25 they reached the Thompson river. Here the question arose whether they should go up the river and cross to the Cariboo or go down the valley to Fort Kamloops. Owing to the scarcity of provisions and the weakness of their party, they decided on the latter course. Four days later they arrived at Slaughter Camp, so named because the Canadian party on Sept. 22, 1862, about ten months before, had halted to kill their oxen and to dry the meat. Beyond this point they could find no road, and progress could be made only by laboriously cutting a track through dense forest with the one small axe left to them. Kamloops lay one hundred miles to the south, and the month that followed was a nightmare. Game, fish and berries were not to be found, and on August 8 they came upon the headless body of an Indian who had perished of hunger. Next day, Blackie, smallest and weakest of the horses, was shot for food. Bucephalus, one of the three remaining horses, fell one hundred feet over a precipice, but brought up against a tree and was rescued with difficulty. On August 16 the Assiniboine's horse was killed for food, but on August 18 Cheadle heard a crow which he rightly interpreted as a sign of open country. This good omen came none too soon for tempers, as well as clothes, were frayed and Cheadle had an enormous boil on his knee. Milton and the boy had a grand row, Milton swearing and the boy taking out his gun to shoot but Cheadle came up in time to make peace. O'Byrne and the Assiniboine quarreled, the latter struck the Irishman on the head and Cheadle again had to put things square. On August 28 the sorely harassed party reached at twilight a long rambling shanty kept by a

Capt. St. Paul, where for a dollar a head they had a greasy soup of bacon, cabbage and pease in a tin dish, beautiful white galette and tea and sugar. "Milton and I did wonders!" wrote Cheadle. That evening there was a dance at the shanty and the dancers were rather incredulous when they heard that the ragged gaunt men were a mere party of pleasure! Next day Capt. St. Paul transported them across the south branch of the Thompson river to Fort Kamloops and civilized life. Here they parted company with Mr. O'Byrne.

The remainder of their journey may be rapidly sketched. They passed down the Fraser river to New Westminster, then took steamer to Victoria where they called on Governor Sir James Douglas, "a fine old fellow with magnificent presence but rather affected drawling air." They made Assiniboine and family happy by driving them in a buggy drawn by a pair of dashing horses with Milton and Cheadle on the box, and by taking them to the theatre. On September 29, a month after reaching Kamloops, they were back in New Westminster with "Assiniboine and Co." who left the next morning. On October 2 Milton and Cheadle left for Cariboo by river steamer and the famous Cariboo trail. After inspecting the gold mines for several days they were entertained at dinner in the hospital by Dr. Black and Dr. Bell, the one patient being veiled from sight by a sheet of green baize.

Leaving the Cariboo district on November 5, they returned to Victoria, then to San Francisco on Dec. 26, where they stayed four weeks, then left for Panama. They crossed the isthmus by railway and at Aspinwall took passage on the *Ariel* to New York. From New York they went to Washington where in the Senate they heard President Lincoln denounced as a viper! Back again in New York they sailed on February 24 on the steamship *China* reaching Queenston on March 7, 1864.

Cheadle's subsequent career showed that he was more than a sportsman and adventurer. He rose steadily in the medical world: Fellow of the Royal College of Physicians, Dean of St. Mary's Hospital Medical School, and physician to the Great Ormond Street Hospital for Children. It was with children that his interest mainly lay and his private practice reflected that interest. He studied infantile scurvy, his book on Infant Feeding went through five editions,

and the subject of his Harveian Lecture was "Acute Rheumatism in Children." A radical in his day, he was one of the first lecturers at the London School of Medicine for Women. A second visit to Canada in 1884 with the British Association for the Advancement of Science brought on an attack of dysentery which permanently impaired his health, but death did not come till 1910.

Of Milton and Cheadle's trip across Canada one may ask, like little Peterkin, what good came of it at last? Was the trip only the hazardous venture of two tenderfeet over a trail which fur traders had travelled for more than half a century? True it is that many of their mishaps were due to ignorance and to lack of proper planning, but as far as Cheadle is concerned the mistakes were chiefly of the heart and little of the head. He was in a double sense the strong man of the party, at once its peacemaker and its cohesive force. It is not too much to say that the lessons he learned, on that trip, lessons of toleration, readiness to learn, patience and dogged perseverance in the face of apparently insurmountable difficulties stood him in good stead in later life. Even higher than these qualities was his capacity for finding the kernel of the situation, which was that the true North-West Passage, the highway to the Orient, lay, not by sea where it had long been vainly sought, but by land. The publication of Cheadle's book in 1865 entitles him to rank as one of the spiritual fathers of the Canadian Pacific Railway.

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SUMMARY

Constituent Societies	15
Honorary Members and Honorary Officers	11
Active Members	355
TOTAL	381

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Illinois	20	Texas	3
Indiana	6	Virginia	9
Iowa	2	West Virginia	4
Kansas	2	Wisconsin	8
Kentucky	4		
Louisiana	5	Total United States	362
Maryland	29		
Massachusetts	18	CANADA	12
Michigan	12		
Minnesota	4	ABROAD	7
Missouri	4		
Nebraska	5	Grand Total	381

ANNOUNCEMENTS

American Association of the History of Medicine.

The Sixteenth Annual Meeting of the Association will be held at Atlantic City, N. J., on Monday, May 6, 1940. The meeting will begin at 10 A. M. Preceding the afternoon meeting a short business session will be held at 2 P. M.

A meeting of the Council of the Association will be held on Sunday, May 5, 1940 at 3 P. M. Members of the Association who are not members of the Council are invited to attend this meeting in an advisory capacity.

Members who intend to present papers are requested to communicate as soon as possible with the President of the Association, Dr. Esmond R. Long, Henry Phipps Institute, Seventh and Lombard Streets, Philadelphia, Pa.

We are glad to announce that Dr. Howard A. Kelly presented the Johns Hopkins University with a number of copies of the *Dictionary of American Medical Biography* which he published with Dr. Walter L. Burrage. A copy of this remarkable book which is indispensable to all researchers in medical history was sent to all Constituent Societies of the Association. At the same time the Johns Hopkins Institute of the History of Medicine decided to send in the future all its publications to the Constituent Societies.

Sesquicentennial of the Medical Society of South Carolina.

The Medical Society of South Carolina—Charleston County unit of the State Medical Association—celebrated its sesquicentennial anniversary on December 5, 1939. A historical sketch of the Society was presented by Dr. James J. Ravenel, President of the organization. Dr. Douglas Jenkins, President of the South Carolina Medical Association brought greetings from the state organization and Dr. William Weston of Columbia presented a tablet from the Association to the Society. The Medical Association of Georgia presented the Society with a picture showing the first surgical operation

under ether anaesthesia performed by Dr. Crawford W. Long at Jefferson, Ga., on March 30, 1842. Among the speakers were Dr. Nathan B. Van Etten of New York, President-elect of the American Medical Association and Dr. Francis R. Packard of Philadelphia who spoke on " Scientific Links Between Charleston and Philadelphia in the Eighteenth Century." The Medical History Club of Charleston was host at a luncheon in honor of Dr. Packard who spoke on incidents in the early history of the Pennsylvania Hospital and demonstrated a book of case histories of 1800. An exhibit was held at the Gibbes Art Gallery displaying pictures and books relating to the background of the Medical Society.

[Communicated by Dr. J. I. Waring.]

CHICAGO.

On January 9, 1940, Dr. William A. Pusey read a paper on " High Lights in the History of Chicago Medicine " at the Rosenwald Museum of Science and Industry under the auspices of the Chicago Institute of Medicine, the Society of Medical History of Chicago and the Chicago Historical Society.

[Communicated by Dr. Arno B. Luckhardt.]

SESQUICENTENNIAL OF THE MEDICAL SOCIETY OF DELAWARE.

Leaders in civic life joined members of the medical profession in the tribute to early physicians when the Medical Society of Delaware celebrated its Sesquicentennial on October 9, 10, and 11, 1939. Organized by a group of twenty-seven physicians and chartered on February 3, 1789, the Society is the third oldest state medical society and the second oldest medical corporation in the United States.

The sessions were held at the Delaware Academy of Medicine, Wilmington, in a building which dates nearly as far back as the Society itself. The old Delaware Bank, chartered in 1795 and the present building erected in 1816, has been the home of the Delaware Academy of Medicine since 1932. It is located along the Park Drive upon land adjacent to that once held by Tyman Stidham, the first doctor in Delaware.

Several special features marked the event, including, a military ceremony at the grave of James Tilton, M. D., who was the first president of the Society, and the first Surgeon-General of the United States Army; a banquet attended by state and national dignitaries, a guest of honor being Dr. L. A. H. Bishop, of Dover, a past president of the Society, and the only physician now living who attended the Society's Centennial meeting in 1889; the publication of a History of the Society, 1789-1939, to commemorate the event; and an historical exhibit, which helped to picture the medical background of the state, consisting of original photographs, miniatures, and daguerreotypes of the physicians who had been presidents of the Society, old books, instruments, diplomas, fee bills, and the following items of especial interest:

Medicine jar and scales used by the Revolutionary patriot, Dr. John McKinly (1721-1796), a founder of the Society and the first President of Delaware.

Treasurer's Book of the Society with continuous entries from 1822 to 1932.

Saddle Bags used by Dr. Joseph P. Chandler (1810-1879) during his years of practice at Centerville, Delaware.

Miniature of Dr. James Couper, Jr. (1803-1865), New Castle, Delaware, several times president of the State Society, and a vice-president of the American Medical Association in 1863.

A pamphlet "An Eulogium, to the Memory of James Tilton, M. D., delivered by appointment before the Medical Society of the State of Delaware, on the 13th day of May, 1823, by Allen McLane, A. M., M. D., vice-president of the Society," Wilmington, printed at the Gazette Office.

Matriculation cards of William Marshall (1827-1900), Milford, Delaware, at Jefferson Medical College for the years 1845-1846 and 1846-1847, containing the signatures of Robley Dunglison, Franklin Bache, Joseph Pancoast, Robert W. Huston, Charles D. Meigs, and Thomas D. Mütter.

[Communicated by Mrs. Ava T. Watson]

Microfilm Sets of Periodicals

The Committee on Scientific Aids to Learning, President Conant of Harvard, chairman, has made a grant to cover the cost of making a microfilm master negative, on the most expensive film, of sets of volumes of scientific and learned journals.

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[Communicated by Mr. Cuthbert Lee, Director of the American Documentation Institute.]